Testing a price breakout strategy using Donchian Channels

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Contents

Abstract

This research report implements and tests the effectiveness of a trend following trading strategy on the South African Futures Exchange (SAFEX) through utilising Donchian Channels and modelled after the 'Turtle method' which was first popularized in the United States in the 1970s before the automation of trading models. Prior literature focused on the commodities and equity indices spectrum of futures contracts in North American and Asian markets while this report replicates the model and attempts to optimize it for use on the SAFEX. The objective of this research is to invigorate academic study of trading strategies in the South African market by employing what was a successful, albeit very simple, trend following strategy on a sparsely studied academic field in South Africa.

The contrarian trading strategy comprises three systems that generate idiosyncratic entry and exit signals using Donchian Channel theory to identify a price breakout from an average true range (ATR) band in the attempt to profitably trade on a price trend. The three systems implemented include: The short term system (System 1) generating a 'long' position when an instrument price moves above the 20-day 'high' and exit when it moves below the 10-day 'low', and vice versa for short positions; the long term system (System 2) following the same logic with 55-day entries and 20-day exits, and a third system (Integrated system) integrating the short and long term systems. A 20-day average true range is used to determine position sizing, stop-losses and additional contract purchases when a price-trend is potentially identified, while fractional asset allocation theory is drawn upon to determine optimal capital allocation to position. The three strategies are implemented and tested for optimality on ZAR-denominated SAFEX contracts available to a South African investor in the agriculture, currencies, equity indices, energy and precious metals sectors (45 instruments in total); across their entire respective datasets using a notional portfolio amount. A two-period back-testing methodology is utilized where the initial (in-sample) period is used to conduct sensitivity analyses and stress tests on the strategy inputs to optimize the model for the South African market. The final 3-years (2012-2014) are then used to test this optimized model on this out-of-sample period. The results were compared across the systems and against the buy-and-hold benchmark of the underlying instrument using the Sortino and Sharpe Ratios and t-test of significance against returns.

The in-sample tests found that the strategy was not able to consistently outperform the benchmark metrics over the period, and did not produce significant enough abnormal returns to justify the risk taken on by an investor. This was exemplified by the volatility of returns which arose not due to numerous instances of negative returns, but rather events of very large profitable trades after capitalising on a price-trend accompanied with numerous smaller capital drawdowns. The out-of-sample tests produced far more encouraging results despite the recurring theme of significant volatility present as the majority of sectors were able to generate significant abnormal returns and therefore able to outperform the benchmark metrics by some degree. The majority of results were statistically significant; however the power of these inferences was diminished by the noise generated from the extreme volatility of returns. This was exacerbated by the additional volatility introduced from the USD/ZAR exchange rate present in the underlying instruments in commodities, energy and the majority of the agriculture sectors. As a result, the most promising sectors for future research on a risk-adjusted returns basis were the ZAR-denominated contracts being the currency and equity index sectors, with sunflower seeds, wheat, white maize and yellow maize also generating strong results.

The testing of the strategy across the spectrum of tradeable futures contracts in the South African market is in the objective to further the field of academia in testing trading strategies on a sparsely studied market in the field of technical analysis, particularly the subsets of trend following and Donchian Channels. The results are encouraging in that strong performers on a risk-adjusted returns basis were ZAR-denominated contracts available to the South African investor. This research hopes to springboard further study in this field by correctly channelling avenues of research and highlighting areas where robustness of testing is required.

List of Tables

List of Figures

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1. Introduction

The South African academic literature landscape is significantly sparse when it comes to the study testing of trading strategies, more so in the subset of trend following and Donchian Channels. As Malkiel (1973) so poignantly says, "Technical analysis is anathema to the academic world. We love to pick on it," and this is particularly true on the Johannesburg Stock Exchange (JSE). The view of this paper is to break down these barriers and open the door for further research into the field as the South African market grows and matures over time so that academic study is well positioned to keep pace with this growth. Mature, developed markets in Europe and North America, and even some developing markets in Asia, have a wealth of study done on the field that has been a platform for breakthroughs in profit-seeking techniques and analyses while growing markets in Africa have not had the same attention despite the differences in life cycle and market structures. This paper attempts to invigorate academic study of trading strategies in the South African market by employing a successful, albeit very simple, trend following strategy used in the United States in the 1970s dubbed the "Turtle method" and implement it on the South African Futures Exchange (SAFEX). The strategy will then be optimized for use in the market.

To achieve this, the strategy will first be discussed in detail in Section 4 regarding the inputs and constraints to the model covering entry & exit signals, volatility measures, position sizing using correlation matrices, pyramiding of trades and stop-loss orders. Once constructed, the strategy will be tested across a set of 45 futures instruments within 5 sectors (being agriculture, currency market, energy, equity indices and precious metals) over the in-sample period of data. Various optimization techniques will be used to try improve on the model for the South African market, detailed in Section 4.4. Once optimized, the strategy will be tested again on an out-of-sample data period ranging from 1/1/2012 – 31/12/2014 on the same underlying instruments. Both sets of results are compared against the benchmark of a buy-and-hold strategy in the underlying instruments and analysed in Section 5, with the detailed results shown in Appendix 8.7 and the historical evolution of performance metrics shown in Appendix 8.8.

The focus of this research is not on the robustness of results, but rather the applicability and feasibility of testing trading strategies that utilize Donchian Channels on the South African market so that further research can improve and build on this field of study

1.1 Research Aims and Objectives

The overall aim of this research is to implement a trend-following technical analysis model based on price breakouts on the South Africa futures exchange. The strategy will be backtested and subsequently optimized for use in the South African market. Ultimately the study attempts to identify, examine and quantify the use and applicability of a specific branch of technical analysis that has succeeded innumerably on a global scale, in a South African context and use reasoning provided for in academia to do so.

Specifically, the objectives of this study are to:

1) Evaluate critically existing literature on technical analysis, with a specific look at Donchian Breakout Channels and trend following literature
2) Build, implement and backtest the trend-following model on the South African Futures Exchange

3) Optimize said model through further back-testing and sensitivity analysis
4) Critically evaluate results

1.2 Value of Research

The research provides further insight for academia by adding to the literature in the following ways:

Firstly, technical analysis has not been widely studied in academia given nature of the analysis itself; being a movement away from the fundamentals of finance proffered in academia and more towards simplified pattern identification ultimately in a variety of differing models; eschewing the fundamental building blocks that give rise to asset prices and its movements over time, for example. The research attempts to bridge the gap between academia and technical analysis to some degree, at the least in South African context, and provide greater insight into a field that has not been studied in academia on the South African market. Secondly, the study will help proprietary traders allocate a portion of their books to an automated trading model in a variety of applications ranging from a catch-all structured hedging instrument in large down or upswings in applicable markets, construction of long-short hedge fund strategies in commodity or macro-market based funds to an all-out profit-seeking trading book. In this regard the research has relevance across numerous financial disciplines and institutions - from asset managers to investment banks, or trading funds to the individual. Ideally this study will provide some academic proving ground for South African technical analysts where there was not before.

1.3 Overview of dissertation

This paper is structured such that Section 2 provides the theoretical underpinnings widely discussed in the areas of efficient markets hypothesis and broader areas of finance. Section 3 reviews prior empirical literature on analysis of the Turtle methodology, trend following, trading strategies, futures contracts and broader technical analysis themes. Section 4 reviews the collated data underlying instruments tested. It continues with the back-testing and model optimization methodologies. Section 5 discusses the empirical results and finally, Section 6 concludes and outlines areas for future research.

2. Theoretical Overview

Before we can examine trend following, it is pertinent to consider the academic theory that has had a significant influence on modern trading practice and trend following strategies: information efficiency. Trend following traders systematically trade on the trends observed in the price movements of any preferred financial instrument, therefore the literature underpinning asset pricing theory and models (such as the CAPM and APT) will not be directly addressed as valuations and return predictability are not a concern for trend followers. Rather the pattern identification within the price movements of a financial instrument are the focus of trend followers, as trades are conducted based on strategies developed and exercised on price movements. Whether the concept of market efficiency holds will be touched upon in this paper, however it must be noted that the accuracy of the asset pricing models in determining the true value of financial instruments in isolation is of little concern to trend followers who trade on identified price trends on those instruments.

The theory discussed in this chapter summarise the research that explores the following fields of study: Section 2.1 addresses informational efficiency and the Efficient Market Hypothesis, Section 2.2 discusses trend following and technical analysis and Section 2.3 concludes.

2.1 Information efficiency

Throughout the twentieth century, the modelling of financial price data for various factors has been actively pursued in academia, with the earliest and most influential work extending to Bacheliers (1900) doctoral thesis on Bond Price modelling on the Paris Bourse. In his 'Theory of Speculation' he provides that the factors which influence the movements of the Stock Exchange are "innumerable… events past, present or even anticipated… have repercussions on its course." It is information efficiency in a capital market then that describes the extent to which instrument prices adjust to new information in order to reflect all of Bacheliers (1900) 'influences' (i.e. information) relating to that security.

This theory of the markets being "informationally efficient" was solidified by Fama (1970) and presented as a "fair game model" where all market participants have equal access to market information, meaning that all securities are priced fairly, assuming that investors behave rationally. This concept was developed further in his influential paper that defined market efficiency hypothesis which assumes that security prices fully reflect all available information. (Fama, 1971) This simple definition was given in order to circumvent the contentious issue of defining what is considered reasonable information and trading costs.

2.2 Efficient markets hypothesis

The "fair game" model described by Fama (1970) as the hypothesis that all securities accurately reflect all available information at any point in time, referred to as the Efficient Market Hypothesis (EMH). This concept of an efficient market was segmented into three levels of efficiency in order to determine the time intervals where the extent of information efficiency could be isolated. The reason for this segmentation is that an entirely efficient market is only theoretically possible as investors have insufficient access to non-public information, combined with the prevalence of under or over reaction to information by investors. These three forms of market efficiency were first described as weak-form, semi-strong-form, and strong-form efficiency.

A *weak-form efficient* market is one where stock prices accurately reflect all available market information only, such as historical prices, return metrics, trading volumes, yield metrics and any other market generated information. The hypothesis proffers that market prices (and any other market information) and future rates of returns should have no identifiable relationship, since historical prices do not contain any information about future stock price movements.

A *semi-strong-form* efficient market is one where stock prices accurately reflect the information of a weak-form efficient market, as well as adjusting rapidly to all announcements of public and non-market generated information, such as dividend or earnings announcements and financial statement information.

A *strong-form efficient* market is one where stock prices accurately reflect the information of a semi-strong and weak-form efficient market, as well as information from private sources. Therefore, investors should not be able to derive positive average profits on a consistent basis as individuals would have access to all public and private information, meaning price sensitivities would accurately respond to all market information.

The levels of efficiency of the EMH were redefined by Fama (1991) as "tests for return predictability", "event studies" and "tests for private information." This revision of the levels of efficiency altered our understanding of them to some degree, yet it was the re-categorization of the weak-form efficiency that is pertinent to this paper. Fama (1991) asserted that future rates of return should not be predictable based on firm-specific attributes and historical fluctuations in returns. Essentially, historical rates of return (as well as other market based information) should follow a 'random walk.' The random walk hypothesis was developed by Bachelier (1900), popularized by Malkiel (1973) and Fama (1965), and follows that stock market prices evolve according to a random walk meaning that historical prices cannot be used to predict future stock prices as a result of this and is thus consistent with the efficient market hypothesis.

It must be noted that Fama's (1970) EMH relies on overly simplified assumptions of rational behaviour and costless information, yet Grossman and Stiglitz (1980) contend that information is in fact not costless. Relying on the assumption of rational behaviour, investors would only attempt to gather information until the marginal cost of obtaining that information outweighs the marginal benefit derived from the information, until such a point as it does not make economic sense to continue the process. This means that stock market prices would reflect only the information up until that point where gathering information yields greater costs than it does benefit, as opposed to reflecting all available information. Fama (1991) agreed with this supposition on the grounds that there would be positive trading and information costs, implying that the "extreme version of the market efficiency hypothesis is surely false."

2.3 Summary and Conclusion

This section provides a theoretical overview of the empirical studies underpinning market efficiency, which will provide an understanding of the investigations and tests later in this paper.

The strong and semi-strong forms of market efficiency are not integral parts in terms of the understanding of trend following strategies, as again, trend followers simply trade on the price movements and the identified entry and exit signals within those movements only based on a developed mechanical trading system. Ergo, trend followers are not concerned with the public or non-public informational content of share prices as trends are identified on purely mathematical and quantitative grounds.

This implies that trend following is directly inconsistent with the weak-form efficient market hypothesis, and inherently the random walk hypothesis, as historical instrument prices are utilized to 'forecast' (in the broad sense) future instrument prices and obtain consistent positive average profits.

3. Literature Review

This review is structured such that Section 3.1 discusses the broader underpinnings of technical analysis, with Section 3.1.1 diving deeper into the trend following subset of the field. Section 2 reviews various trading strategies and the empirical studies thereof and Section 3.3 looks into the prior literature on the Turtle trading strategy. Section 3.4 reviews fixed fraction asset allocation and its implications for position sizing and risk mitigation in a trading strategy, with potential uses in our research. Lastly Section 3.5 outlines the literature surrounding futures contracts and their findings. Discussion on South African focused literature is conducted throughout, where applicable and available.

The literature on trend following, a form of technical chart analysis, is not particularly extensive compared to the fundamental based investment strategies that place more reliance on theoretical concepts of information efficiency, asset-pricing theories and anomalous style factors. Prior international research on trend following has identified the potential of positive average profits and its benefits of employing the strategy; applying the methodologies across multiple financial instrument classes; optimizing the intrinsic factors within trend following such as money management, risk control and price analysis; as well as the investigation of differing trend following methodologies and tests thereof. However, although Brock, Lakonishok and LeBaron (1992) describe the upturn in work on technical analysis as a whole in the financial sector, it is Malkiel (1981) that epitomizes the extent of literature on trend following: "Technical analysis is anathema to the academic world. We love to pick on it." Brock et. al (1992) contend this view in stating that studies on technical trading have found the existence of various levels of serial correlation amongst stock returns which therefore provide evidence of predictability of equity returns from past returns. Thereby placing the efficient market hypothesis under contention; and hence the existence and exploitability of trend following strategies.

3.1 Technical Analysis

Although not the focus of the paper, trend following falls under the umbrella of technical analysis. The founder of the Wall Street Journal, Charles Dow, created the first market index and the first widely followed public information literature on business activity. Yet he was also considered to be the father of technical analysis since his Dow Theory was the first technical method to predict future movements of security prices. It was Dow who suggested that stock prices tend to move in trends, and the recognition and exploitation of these trends was a key to profitable investing. (Pring, 2002) The persistence of these trends to last longer than random behavioural hypotheses would predict is the key to profitable investing, and technical analysis' main objective is to identify trends in security prices. (Kirkpatrick & Dahlquist, 2007)

Channel breakouts, a key part of trend following strategies, have been studied in financial literature since the 1960s. Edwards and McGee (2007) describe support and resistance levels in their work, while Alexander's (1961) filter rules were on of the first academic studies of this phenomenon and an integral part of any trend following strategies success. Lukac and Brosen (1990) conducted a comprehensive study of technical trading systems by analysing twelve different trading signals including breakouts, on several markets over a ten-year period. Taylor (1994) conducted a similar study of currency futures trading based on channel breakouts with both studies generally finding differing degrees of positive average profitability. Brock et. al. (1992) strongly advocate technical analysis' ability to predict stock price changes in their examination of the Dow Jones Industrial Average Index from 1897 to 1988. The literature on technical analysis suggests

the use of trend following strategies as a feasible option for investing and trading, lending to the importance of conducting academic study in the South African market.

An evident class of technical analysis to be focused on in this research is trading range breakout rules (TRBs). TRBs can be thought as a momentum indicator, since their main premise is that a positive or negative momentum is built, when a stock breaks through or falls below its trading range after several days of trading. Briefly, a trading range can be thought of the spread between the recent minimum and maximum of the current price. TRBs generate buy positions, when the current price exceeds the recent maximum by at least some band; while they generate sell signals when the current price falls below the recent minimum by at least another, or the same, band. For example, Brock, Lakonishok & LeBaron (1992) and Bessembinder & Chan (1995) apply these over the 50, 150 and 200-day periods and use bands of 0 and 1%. Coutts and Cheung (2000) further investigates the applicability and validity of trading rules in the Hang Seng Index on the Hong Kong Stock Exchange for the period January 1985 to June 1997. Although TRBs are commonly used in terms of implementation they fail to generate positive abnormal returns, when accounting for transaction and opportunity costs of investing. Irwin & Park (2007), in their technical analysis survey, categorize these strategies as profitable trading rules.

Other subsets of technical analysis include the Channel Breakout (CHB) and Volatility Breakout (VOLB) rules. The channel breakouts originate from Richard Donchian, a pioneer in futures' trading (Kestner, 2003). Essentially a 'channel' of price changes is created by the plot of the high and lows of the price during 'x days', also being used to measure market volatility. Trading entries happen when prices move into or above the channel. A buy (sell) position is taken when the days close is higher (lower) than the previous *n*-days closes. (Sermpinis and Stasinakis, 2013) These Donchian Channels as they were called form the basis of this research and are discussed further in 3.2 below

Sermpinis and Stasinakis (2013) go on to describe Volatility Breakout rules being based on the following parameters:

- The reference value gives a measurement value to the price move.
- The volatility measure is a computational calculation of the market volatility and it is used to identify significant movements from random prices.
- The volatility multiplier specifies how sensitive the price move is.

The combination of these parameters also results in high and low entries signals of a similar nature. Qi and Wu (2006) suggest that the best rule for trading the JPY/CHF exchange rate is channel breakouts, while Olson (2004) contested that the profits to technical analysis in the currency market have been eroded over time. While the volatility rule is not specifically addressed in this research, a subset of it is used in determining capital sizing requirements, discussed in Section 3.5.

3.1.1. Trend following

Trend following is an investment strategy based on the technical analysis of stock market prices only, as opposed to the fundamental factors underlying those prices. Traders and investors utilizing a trend following strategy believe that market prices tend to move in some direction over some time period, by analysis of the current and historic instrument price in order to determine the correct entry or exit of a trade. Another interesting definition of technical analysis is given by Pring (2002: 2), 'The technical approach to investment is essentially a reflection of the idea that prices move in trends that are determined by the changing attitudes of investors toward a variety of economic, monetary, political, and psychological

forces.' Furthermore he adds that 'the art of technical analysis, for it is an art, is to identify a trend reversal at a relatively early stage and ride on that trend until the weight of the evidence shows or proves that the trend has reversed.' Fung and Hsieh (2001) further explain that trend followers "apply capital resources to different markets in a dynamic fashion and do so in a manner peculiar to their individual skill and technology."

As mentioned, the inception of using trend-following trading strategies can be largely traced to Richard Donchian in the 1930's. He employed a short and long term average trading rule to generate buy and sell signals in the belief that commodity futures prices changed through long sustained moves over time (Costa, 2004). Accurately predicting the direction of a sustained move in price over time allows for entry or exit signal identification thereby allowing possible arbitrage opportunities or profitable execution strategies. Various technical rules followed today are adapted from his earlier work, most notably the commonly-used 5 and 20 day moving average rule, thought to represent the amount of trading days in a week and a month respectively. The core of Donchian's early work stipulated that the 5 day moving average had to cross over the 20 day moving average to generate a signal, and also that the closing price on the day the signal was generated had to exceed (fall short by) a minimum of 1 standard deviation of the previous day's closing price. Enforcing these criteria ensure signals are only generated by a minimum magnitude of price changes, thereby making the rule self-adjusting as price changes increase or decrease in magnitude. So began the development of Donchian Channel's, a prominent technical analysis technique that forms the basis of this research. This paper will focus more on the channel breakout signals generated from a modified trading rule, discussed further on.

Merton (1981) provides a framework for market timing strategies in this regard, however it is important to distinguish market timing from trend following. Although market timers and trend followers attempt to benefit from price movements, they do so in different manners. Merton (1981) describes how a market timer will forecast the direction of an asset, going long to capture a price increase and short selling to capture a price decrease. A trend follower on the other hand, attempts to capture "market trends." Market trends are commonly related to serial correlation in price changes, which as mentioned featured in the early tests of the efficient market hypothesis. (Brock et. al, 1992) A 'trend' is therefore a series of instrument prices that move persistently in one direction over some given time interval where the price changes exhibit positive serial correlation. Trend followers attempt to utilize this perceived property in order to identify developing price patterns and trade in the direction of the trend if, and when, it occurs. Brock et. al (1992) do not advocate that there is a persistent existence of trends in the market however the literature documenting the predictability of current returns from past returns is extensive.

Lo and MacKinlay (1988) found that weekly returns on portfolios of NYSE stocks grouped according to size demonstrated positive autocorrelation, as did Conrad and Kaul (1988) in examining Wednesday-to-Wednesday returns (to mitigate the nonsynchronous trading issue). Cutler, Poterba & Summers (1991) found results across a large number of asset classes supporting positive correlation of returns at the time horizon of several months, while negative correlation at the 3-5 year time period. Lo and MacKinlay (1990) again reported positive serial correlation in weekly returns for indices in this case, and negative serial correlation for individual stocks. Poterba and Summers (1998), Fama and French (1986), De Bondt and Thaler (1985) and Chopra, Lakonishok & Ritter (1992) generally found negative autocorrelation in returns of various portfolios and individual stocks over three to ten year intervals. Jegadeesh (1990) looked at lagged effects, finding negative serial correlation for lags up to two months and positive correlation for longer lags. In a broad sense, the findings

of contemporary literature confirm those of the earlier literature in that daily and weekly returns are predictable from past returns (and other financial factors) to some degree.

Returning to Merton's (1981) market timer framework, it is Fung and Hsieh (2001) that formalized the different strategies of trend following and market timing by developing the concepts of a Primitive Market-Timing Strategy (PMTS) and Primitive Trend-Following Strategy (PTFS). The objective was to try capture the general characteristics of the entire family of trend-following and market-timing strategies; as opposed to attempting to mimic any specific one. They achieved this by demonstrating empirically that look-back straddle returns resemble the returns of trend-following funds, and found that trend-following strategies exhibit strong positive skewness and tend to have positive returns during extreme up and down moves in world equity markets. This could be explained by a combination of movements in currencies (deutschemark and Japanese Yen), commodities (wheat and silver), three-month interest rates (Eurodollar and Short Sterling), and U.S. Bonds; yet not as significantly by stock indices. Fung and Hsieh (2001) cite that the reason for this is that stock indices are the least popular instrument employed by Commodities Trading Advisor Funds (CTAs). Futures markets have found to generate significantly greater profitability in the findings of Anderson (2000) and Peterson and Leuthold (1982) trading on CBOT Corn and T-bond futures instruments. The literature reporting trading model profits across numerous futures markets is extensive, including Bear and Stephenson (1970) in agriculturals, Boothe and Longworth (1986) in foreign exchange and Lukac (1989) across twelve different markets to name a few. This highlights the importance of employing an optimized trend following study on the South African futures markets given the lack of literature in this field, as the highly leveraged nature of futures markets and low associated transaction costs (an issue addressed further on) as a result make them appealing to trading model developers.

Lastly it was found that trend followers have non-linear, option-like trading strategies, implying that they tend to perform "as if they are long 'volatility' and 'market event risk,' in the sense that they tend to deliver positive performance in extreme market environments." (Fung and Hsieh, 2001) This was also confirmed by Gencay (1997) who found strong evidence of nonlinear predictability in stock market returns by using past buy and sell signals of a moving average trend following rule. Therefore, this paper will look at a large number of different financial instruments on the JSE, with a particular focus on extreme market environments, to test both these findings.

3.2 Trading strategies

Within the umbrella of trend following, there are numerous approaches to investment in terms of employing a trend following technique on the stock market. While trend followers have the tendency to converge on the same trend for the most part, the reasons behind why this occurs and how this trend was identified may be different due to differing entry and exit signals. However investors will employ a trend following strategy that best suits their investment appetite and current market position.

One example described by Dahlquist (2005) as the most popular strategy amongst market technicians, is the traditional trend following moving average crossover strategy. The concept is that a trend is considered to be initiated once a shorter period moving average of n days penetrates a longer period moving average of $(n+t)$ days. This provides the entry signal for a trader to either go long (buy) or go short (sell) on a stock and subsequently take advantage of the deemed trade and profit off the price movement. There are various techniques for generating an exit signal, such as shorter period moving

average n day 'high' values, for example, but this is a demonstration of a simple trend following. Moving averages provide the advantage of smoothing erratic stock price data by de-emphasizing daily volatilities of that stock.

Brock et. al (1992) investigate two techniques for predicting stock price changes: using a moving average oscillator system and a trading-range break method (including resistance and support levels). As mentioned, the moving average-oscillator system is one where buy and sell entry signals are generated by two moving averages of a shorter period penetrating, or crossing over, the longer period average. The trading-range break method is one where buy and sell signals are generated as stock prices reach new local maximum or minimum over some tested period, being the preceding 50, 150 and 200 days. Brock et. al (1992) also instituted a band technique, where the price level must exceed the local maximum by 1% or fall below the local minimum by 1%. This band essentially reduces the number of buy or sell signals by eliminating 'whiplash' signals and bid-ask bounces across the stock trading prices in order to mitigate 'false' signals (a phenomenon where long and short period averages almost converge but do not actually cross each other) and therefore eliminate unnecessary trading costs. A 10-day holding period return was calculated following the buy and sell signals. The results found that buy signals on the Dow Jones Index during the 1897 to 1986 consistently generated higher returns than sell signals, and that the returns following buy signals are less volatile than returns following sell signals. More importantly, Brock et. al (1992) found that their results were consistent with technical rules having predictive power over stock prices.

Jegadeesh and Titman (1993) tested the concept of trading strategies based on relative strength, where investors buy past winners and sell past losers over the period 1965 to 1989 on the U.S. market, and found that the strategy exhibits abnormal returns. This laid the foundation for Crittenden and Wilcox (2005) who conduct a study that employs a long-only technique of buying stocks at new all-time highs and exiting trading after stock prices have fallen below a ten-day average true range trailing stop. The paper is a comprehensive study on the U.S. market on over 24 000 securities spanning 22 years, where stocks were adjusted for corporate actions; delisted companies were included to account for survivorship bias; realistic transaction costs (slippage and commission) were included and liquidity filters were applied in order to limit hypothetical trading to stocks that would have been liquid enough to trade. Their motivation was that their firm manages a multi-advisor commodity pool that invests primarily in systematic, long-volatility programs with a focus on trend following strategies within commodities, financial futures and currency trading markets as they believe these to be the most systematic in terms of trading and portfolio management. The results found that trend following on stocks does allow positive mathematical expectancy; however the concept of a ten-day average true range trailing stop is intrinsic to this paper, and will be investigated in more detail.

3.3 Turtle strategy

The Turtle Trading System (TTS) is one such trend following strategy that has received much acclaim and interest, being popularized in the works by Covel (2007). The system revolves around Richard Dennis and his partner William Eckhardt who conducted an experiment in Chicago in the 1980's. They taught a group of new traders their "turtle" system and supplied the traders with their own capital to begin trading for them. Reports indicate that the traders (referred to as 'turtles') earned annual average rates of return approaching 80% for most of the decade, with successful turtles earning above 100% in most years. (Covel, 2007) The "Turtle" system became legendary around the trading floors of Chicago and Wall Street into the 1990's until some of the former turtles began conducting seminars to teach others the system. Since that time, various websites and books have appeared detailing the TTS.

The system is based on a form of channel breakouts first exposited by Richard Donchian, and was further developed by legendary commodities trader, Richard Dennis. This was the system named "Turtle Trading," so named for the two groups of traders Dennis hired and trained in 1983 and 1984, due to Dennis observing the ease of turtle farming on a visit to Singapore. Dennis was convinced that trading (before the age of mechanical computer trading) was a skill that could be taught to anyone, stating: "some people tell you 'no', but I think trading is transferrable. It seemed to me so clear that it is transferrable, that there are no mysteries. If it isn't a mystery, then I ought to be able to get people to do that. I don't want to spend so much time working anymore also I want to prove to people that there's no mystery to it." (Covel, 2007) Igniting a nature vs. nurture debate with his partner, Eckhardt, who believed that successful traders were inherently blessed with talent and the skill of trading successfully, could not be mechanically taught. When the experiment was shut down in 1988, the Turtles had made in excess of $170 million, thereby agreeing with Dennis' supposition and in some practical sense, contending on some level with the EMH and Random Walk hypotheses.

Academic literature on the topic is decidedly sparse however. Anderson (2000) examined a breakout system modelled on the TTS to trade U.S. Bond and Corn futures on the CBOT, finding that the trading model was able to generate profits after transaction costs in both markets. Miyazaki and Riles (2004) reported on a group of traders working in a Japanese investment house that found similar successes by basing their trading model on the channel breakout system posited by the TTS. Rayome and Jain (2008a,2008b) have conducted comprehensive studies on the TTS, examining the usage of Donchian channels for 20 day breakouts and again for 55 day breakouts across soybean futures and currency markets separately. The combination and synthesis of these two breakout systems with Dennis' money management rules resulted in the TTS model. Rayome and Jain (2008a, 2008b) found significant instances of positive returns over the 27-year period studied on a risk adjusted and statistical basis. They also found that trailing stops (T-stops) were critical to the success of the model, yet volatility stops (N-stops) did not provide such results. Further research was not conducted on this and opens up the possibility for examination in this paper. It was also found that the returns were extremely volatile, which was confirmed by Covel (2007) and was largely the shortfall of the TTS as investors could not tolerate the volatility of returns despite the success of the system. Anderson (2003) also examined the work of Vince (1990) in conjunction with his study in order to determine the impact of optimal fixed fraction (or optimal *f*) trading to determine minimum account capitalization and reinvestment issues. It was found that when capitalization and reinvestment issues are considered, insufficient funds rapidly produces a trading account with a zero balance, with Anderson (2000) highlight the fundamental importance of instituting an effective money management system. While the TTS does provide such a system, Anderson (2000) and Vince's (1990) allow the possibility for exploring this avenue in this paper and optimizing such a system on the JSE.

3.4 Fixed Fraction Asset Allocation

A fundamental tenet of futures trading is the efficient use of position sizing to achieve optimized portfolio growth given a predefined level of capital. Research in behavioural finance from Haigh & List (2005) demonstrates that changes to a traders position sizes are often related to recent wins and losses in that traders will increase risk when making profits and decrease risk when facing losses; an expected outcome under utility theory. For comparability, our model will employ a fixed fraction asset allocation methodology to the level of capital at hand. The fixed approach (as opposed to varying levels of account risk) provides a useful approximation for assessment of trading rules. While this will be intuitively unappealing

from a behavioural finance aspect (as a trader is faced with the emotional issues relating to profits and losses on a real trading account), it is pertinent to an automated trading model such as ours to ensure the quality of testing.

The literature references the work of Kelly (1956) in using probability theory and intertemporal portfolio choice to determine the optimal size of a series of bets. Known as the Kelly criterion, the capital sizing strategy will do better than any essentially different strategy in the long run (that is, over a span of time in which the observed fraction of bets that are successful equals the probability that any given bet will be successful) in most gambling scenarios, and some investing scenarios under some simplifying assumptions. The application of Kelly's (1956) work on futures trading was primarily conducted by two authors, Gehm (1983) and Vince (1990). Vince (1990) described the technique as *'Optimal f '* and was presented as a portfolio management tool for futures traders. It aims to identify the optimum fixed fraction of the portfolio to bet on any individual outcome. In essence, if f=0.2 the trader would bet a fixed 20% of their portfolio allocated to futures trading on any individual trade – position sizes would increase as profits were accrued and decrease as losses were suffered in relation to capital on hand.

At the *optimal f* point, the rate of reinvestment is found that would maximize the geometric rate of return on the portfolio and so dominate all other betting strategies applied to trading activities. In one empirical study of the value of fixed fractional betting, Ziemba (1987) found that a fixed fraction approach dominated all other betting strategies when applied to a horse-racing data set. In the method proposed by Vince (1990) on a trading strategy, maximizing the geometric rate of return is achieved by modelling the largest observed loss and trading the portfolio reinvestment rate on this basis and determining which multiple of that largest loss would have produced the largest return on the funds invested. Essentially Vince (1990) modified the betting probability aspect of the Kelly criterion to incorporate the position sizing method to a trading portfolio by using largest observed loss as a substitute. To maximize the geometric growth one needs to identify the account capitalization required for each futures contract that produces the highest rate of return on the original investment per futures contracts for a range of f values, referred to as the Terminal Wealth Relative (TWR). As the account capitalization per contract is a function of the f value selected and the largest loss, it is defined as:

$$\textbf{Capitalization per contract} = \frac{\text{Largest observed loss}}{f}$$

If the largest observed loss had been say R1000, the *optimal f* aims to determine which amount of capital should be applied per futures contract. As illustrated by Kelly (1956), if all available funds were allocated to an outcome where the probability of a win is less than 100%, all funds are lost with a probability of one once this loss is encountered. If the amount of funds allocated to the trade is greater than the maximum loss encountered, the trader would be able to continue to participate. Had the trader adopted a more conservative f value (f<1), then extra capital per contract would be allocated, allowing the trader to cover the largest observed losses.

$$\textbf{Number of contracts} = \frac{\text{Capital account balance}}{\text{Capitalization per contract}}$$

The number of futures contracts traded on any given trade for a given level of portfolio capitalization is then a function of the optimum funding per contract divided by the account balance, seen above. If the optimum funding per contract is

found to be R10 000 and the trading account has R100 000, the trader would then trade R100 000/R10 000 = 10 futures contracts on the next trade, for example.

The *optimal f* approach thus resolves two major issues for trading practitioners. Firstly, the amount of money that should be allocated for each futures contract traded and secondly, the number of futures contracts should be traded given a predetermined level of capital or designation towards speculative futures trading activities.

The key to the approach though is identifying the *optimal f* value which is an area open to further research as it is a research field unto itself. Anderson & Faff's (2004) study identified the importance of money management via the *optimal f* technique for speculative traders in futures markets when applying the turtle trading system. While in markets such as US treasury bonds, the results showed that returns of greater than 100% were achievable, whereas the results were exponential in Corn futures where returns of around 2000% were observed. Trade capitalization played a far less important role in those markets where losses were produced and no amount of money management was able to convert the unprofitable trading rules into a winning position. This is found to be true in this research, despite attempts to mitigate capital drawdowns.

Our model will employ the notion of fixed fraction asset location into the capital sizing determinants per trade, however full empirical testing of the *optimal f* technique employed by Vince (1990) and Anderson & Faff (2004) is an avenue for further research due to the computing resources required in determination of the *optimal f* value. Secondly, the *optimal f* strategy is used primarily in a real-time trading scenarios where capital amounts and observed losses are known with accuracy. The power of the strategy diminishes somewhat when back-testing a model due to the use of largely theoretical capital amounts and historic data.

3.5 Futures Contracts

A futures contract in brief is a contract between two parties to buy or sell an asset for a price agreed upon today (the futures price) with delivery and payment occurring at a future point, or the delivery date. This makes the futures contract a derivative product as it is a function of an underlying asset. While designed to mitigate the risk of price or exchange rate movements originally, by allowing parties to fix rates or prices in advance for future transactions (particularly applicable in traded commodity environments), these instruments have evolved to also be used for speculative purposes by parties hoping to predict the direction of underlying asset price movements and as a transfer of risk mechanism. The nature then of derivative instruments and futures contracts on some underlying commodity, index, or currency therefore allows exposure to that underlying instrument for a fraction of the cost based on the contract to deliver an amount of the underlying instrument, thereby allowing this transfer of risk to occur more easily. Given the ability of trading these agreements over a regulated futures exchange (and provided that there is sufficient trading volume), trading costs are significantly lower in relation to proprietary trading of stock equities. (Baptiste, Yau & Wang, 1997) This feature, along with others discussed, is tantamount to the success of an active trading strategy, or a trend following trading strategy such as our model, given the frequent amount of trades dictated by the strategy thereby incurring higher transaction costs than a buy-and-hold approach.

The level of transactions costs incurred often determines whether the profits accruing to a trading strategy is materially significant or not. Bessembinder and Chan (1998) find that the profits documented by Brock et al. (1992) for technical

trading rules on the Dow Jones industrial average are not higher than the transaction costs that would be incurred in implementing them. Cahan, Cahan & Marshall (2008) found that transaction costs, which include spreads and commission fees, are significantly lower in futures markets than stock markets. To highlight this, Lesmond, Ogden & Trzcinka (1999) suggest that transaction costs in US equity markets range from 1.2% for large firms to 10.3% for small firms while Locke and Venkatesh (1997) estimate futures markets transaction costs to be in the range 0.0004– 0.033%. Trading costs are largely ignored in our study as a result, as a significant amount of exposure can be garnered on the South African Futures Exchange (SAFEX) for a relatively low cost. This largely meant that trading costs were by-and-large immaterial to the final performance results. It does however allow future research to include these costs in a trading model to form a more robust view of the trading strategy.

The ability to sell instruments short (short-sell) is an intrinsic component of most active trading strategies, and an aspect of futures exchange readily practiced as a result of high levels of trading liquidity present. Lesmond, Schill & Zhou (2004) show that the assumed profits from short-sales of small illiquid stocks contribute a significant portion of the profits attributed to certain equity market momentum trading strategies. Lesmond et al. (2004) contends that the profits that have been documented for these strategies may be questionable as the practice of shorting illiquid stocks (or any stocks for that matter) may be difficult, if not impossible, in reality. In contrast to this however, short-selling is easily done in futures markets. (Cahan et al., 2008)

Several authors have in fact documented profitability that exceeds reasonable estimates of transaction costs. Lukac, Brorsen & Irwin (1988) found that several technical trading systems, such as moving average and channel break-out systems, yield statistically significant portfolio returns ranging from 3.8% to 5.6% in 12 futures markets during the 1978–1984 period while Irwin, Zulauf, Gerlow & Tinker (1997) found that a channel trading system generates statistically significant mean returns ranging 5.1–26.6% in soybeans, soybean oil, and soybean meal futures during the 1984–1988 period. Cahan et al. (2008) extend this literature by considering 7846 trading rule specifications from five rule families (filter rules, moving average rules support and resistance rules, channel breakouts, and on balance volume rules) and applying these rules to the 15 commodities considered by Wang and Yu (2004). They found that 14 of these 15 markets tested do not generate statistically significant profits after an adjustment is made for data-snooping bias; underlying the significance of an adjustment for this bias and therefore concluding that technical trading rules are not profitable once data-snooping bias is taken into account. This is further addressed in the 4.1.3.

It is imperative to further examine the intricacies of the derivative nature of futures contracts, particularly the relationship between the underlying spot prices and futures contract prices. Our methodology incorporates the underlying instrument prices in the modelling process as a result of this nature. The literature supports the robustness of this approach in that Herbst, McCormack & West (1987) show that futures markets incorporate new information faster than do cash markets given the aforementioned low transaction costs and high liquidity. However, a consideration needs to be made in that market restrictions may produce a lead-lag relationship between prices in spot and futures markets. This relationship illustrates how well two markets are linked, and how fast one market reflects new information from the other (Herbst et al., 1987). In other words, whether one market leads the other or whether bi-directional feedback between the two markets exists. Theoretically, given the nature of futures contracts, futures markets provide an efficient price discovery mechanism as futures prices contain useful information about cash prices of mature markets, which supports the hypothesis that futures prices lead spot prices. Essentially the literature supports the use of the underlying instrument data where actual

futures data is not available (or the integrity of the data is compromised) and further building in specifications such as leverage and contract size into our model.

Diving deeper, the literature on the South African futures market is sparse at best. Looking back into the development of the South African futures market (where our understanding of the relationship between spot and futures prices can be improved from a South Africa context), Beelders & Massey (2002) describe three important innovations that came about with the introduction of electronic trading in the South African market: i) brokerage fees changed from fixed to flexible after the introduction of the new Stock Exchange Control Act in November 1995; ii) the Johannesburg Equities Trading (JET) electronic trading system was introduced on the JSE in June 1996, and iii) the JSE indexes underlying the futures contracts were redesigned to consist of a smaller basket of stocks. They found that these innovations increased the speed of transmission of information shocks between the spot and futures markets.

Beelders and Massey (2002) analysed the speed of transmission of information flows between the SAFEX and the JSE and found that after the introduction of electronic trading the spot and futures markets responded more quickly to their own shocks and shocks from the other market. Using a bivariate-EGARCH model they found that the contemporaneous correlation increases, while spill over and asymmetric effects decrease in size.

Floros (2009) found further confirmed the results and found that both the FTSE/JSE Top 40 spot and futures are co-integrated (using the Johansen test) implying that a co-movement between prices exists (South African futures and spot prices form a stable co-integrating relationship). These results are in line with Smith and Rogers (2006) for South Africa, and Floros and Vougas (2008) for Greece. Floros (2009) concluded, through VECM and an ECM-TGARCH testing, that that there is a bidirectional causality relationship (from futures to spot and vice-versa).

The aforementioned results are fundamental to our testing methodology by substantiating the use of underlying price data in modelling the futures contacts for each market as the existence of co-integration implies that one of the variables can be used to predict the other, and that prices cannot move far away from each other. The robustness of the testing is not comprised as a result, and the strength of the model is improved given that underlying price data is far more readily available, accurate, and complete compared to the futures contracts data provided by the data sources utilized in our study.

4. Data & Methodology

Section 4.1 outlines the data and sampling criteria incorporated in this study. Section 4.2 and 4.3 provide an in-depth outline of the methodology that is used in building the trading model as well as the methodology for testing the model by comparing in-sample and out-of-sample results. There is also a discussion around adjustments for concerns raised in previous literature. Lastly Section 4.4 details the optimization methodology undertaken.

The data was obtained from the *Bloomberg* Terminal, accessed via the Business Corners in the Chancellor Oppenheimer Library at the University of Cape Town. Bloomberg was selected as a data provider due to the significant coverage and availability of derivative and underlying data. Ince and Porter (2006) suggest that individual stock data gathered using *Thomson Datastream* for markets outside of the US requires significant care and consideration due to potential pitfalls in the data.

The raw data was exported to *Microsoft Excel* where it was entered into the model, also built on *Microsoft Excel,* and subsequently backtested and optimized using this platform.

4.1. Data description

The trading system utilizes futures contracts or derivate instruments as discussed. Empirical data on these actual contracts however is difficult to obtain, given the fixed tenure of contracts and the nature of rolling these forward at expiration. Ergo, data has been extracted from the instruments or commodities underlying these derivative instruments. Essentially a futures contract models the returns of its underlying instrument, yet is simply constructed as a contract to return a larger quantity of the underlying at some specific price in the future at some specific date, thereby inherently including some degree of leverage. The underlying spot prices have been used given the greater availability of data (particularly daily data with day's high, low and closing prices) and accuracy of data, allowing wider and more effective back-testing of the sample space with the actual SAFEX futures contracts specifications worked into the model, detailing trading costs (not applicable in our research), maximum contract purchases and leverage allowances. (*Johannesburg Stock Exchange – South African Futures Exchange.* Available: https://www.jse.co.za/redirects/safex)

In line with the previous literature on the Turtle methodology and the original trading mandate, this research is restricted to commodity and equity indices futures. This then ignores individual stock futures contracts due to liquidity constraints in the South African market, however there is possibility for future research in this field. The Turtle model was originally developed for highly tradeable markets such as commodities, with more recent research including equity indices and bond futures. Therefore this research hopes to build on that literature from a South African perspective, specifically given the past successes found in the commodities, currencies and equity indices fields. The key in this research is that all contracts are denominated in South African Rand (ZAR) and are available specifically to a South African investor. The futures contracts listed on the South African Futures Exchange (SAFEX) that are tested in this research are given in Table 1:

Agriculture	Currencies	Energy	Equity Indices	Precious Metals
Coffee	AUD/ZAR	Brent Crude	African Banks Index (ABI)	Copper
Corn	BWP/ZAR	Gasoline	All Share Index (ALSI)	Gold
Cotton	CAD/ZAR	Heating Oil	Capped Top 40 Index	Palladium
Soybeans	CHF/ZAR	Natural Gas	Dividend Plus Index (DiviPlus)	Platinum
Sugar	CNY/ZAR	WTIA Light	Equal Weight Top 40 Index (EW Top40)	Silver
Sunflower seeds	EUR/ZAR		Financial 15 Index (FIN15)	
Wheat	GBP/ZAR		Financial and Industrial 30 Index (FINDI30)	
White Maize	NZD/ZAR		General Retailers Index (GERE)	
Yellow Maize	TKL/ZAR		Gold Miners Index (GLDX)	
	USD/ZAR		Industrial 25 Index (INDI25)	
	ZAR/JPY		Mid-cap 60 Index	
			Resources 10 Index (RESI10)	
			South African Property Index (SAPROP)	
			Shareholder Weighted Top 40 Index (SWIX40)	
			Top 40 Index	

Table 1: Universe of examined South African futures contracts

The instruments in Table 1 were chosen based on liquidity of trading, allowing one to easily enter and exit the theoretical trades, a fundamental criteria for the trading strategy. It is for this reason that 'exotic' or thinly traded derivatives were excluded from back-testing. This, and the fact that data was simply not available for the spot prices of the underlying instruments, meant that the following were excluded:

- Sorghum
- Hang Seng Index
- MSCI SA

4.1.1. Continuity of Data

The time period used in back-testing the data is primarily variable dependent on the instrument being analysed. The reason for this is that the data for daily price statistics of underlying instruments of futures contracts traded in a South African market is sparse. This implies that while some highly traded contract, and its underlying instrument (Gold, ALSI, Brent Crude etc.) had 15 years data available, while relatively thinner or newly traded contracts, and their underlying instruments (Palladium, Copper, Divi Plus etc.) only had 5 year data in some cases. Secondly, it is required of the model that the day's High, Low and Closing price are requisite – therefore the data would only go as far as the Bloomberg platform provided given this requirement. The following resolutions have been adopted to accommodate the lack in comparable data, yet still attempt to mitigate the effect of any potential biases in the data:

4.1.2. Adjustments

Completeness

Complete data is a vital component in attaining robust results. All data in this study is subject to the level of completeness of the data on the Bloomberg database. Some attributes relating to particular instruments were also not available for the entire period, such as missing trading days. Haugen and Baker (1996) suggest assigning population mean values to incomplete data fields in an attempt to avoid a bias in the results. Whilst removing an instrument completely would certainly bias the results of the analysis, assigning mean values may also impact the integrity of the forecasting power of the analysis or the comparability of the data. Therefore, neither approach has been taken and incomplete records have been left as is.

Comparability

The constituents of the sample of futures and underlying data need to be standardized to single uniform currency to ensure comparability in returns. All contracts, and subsequent underlying data, are quoted in South African Rand (ZAR) as they are traded on the SAFEX segment of the JSE. While some major commodities (Brent Crude Oil, Gold etc.) are quoted in US Dollar, actual trading of the commodities on the SAFEX would convert the traded amounts to Rand at the time of trading. Therefore, futures and underlying prices were converted to ZAR using Bloomberg, at the prevailing exchange rate on the relevant historic date to ensure a completely standardized method of conversion. This does however introduce a cross-currency effect where performance returns are bolstered by the depreciation of the Rand against the Dollar. This is noted in results in Section 5, as the comparability of the data is integral.

Liquidity

The instruments tested on the SAFEX can be reasonably assumed to be liquid in the sense that they trade freely and their prices are not significantly impacted by the implicit and explicit cost of illiquidity.

4.1.3. Possible Bias and Solutions

Data Snooping

This is the most significant bias present in backtesting a trading strategy over historic data. Haugen and Baker (1996) explain that the bias associated with data snooping occurs when researchers:

(a) Examine the properties of a database or the results of other studies of a database
(b) Build predictive models employing promising factors based in the previous results, and then;
(c) Test the power of their models on the same database

They mention that the problem can be address by employing data from markets that have not been studied extensively, or predicting by using time periods that are new to analysis.

To remove the threat of data snooping to some extent, this study is conducted on a large sample that has not been the subject of much prior testing if at all. More importantly, a 2-period sample testing procedure is conducted where in-sample results (i.e. the initial period) will be compared against out-of-sample results (i.e. the testing period). This is detailed below:

Out-of-sample testing

The model is backtested across 2-periods of data available for each individual contract, divided as such:

- **In-sample testing:** the initial period where the original model is implemented and optimization testing is conducted. This period runs from the beginning of available data to 31/12/2012.
- **Out-of-sample testing:** the optimized trading strategy, outlined in Section 4.4, is tested over the most recent 3 year period (2012-2014) across all instruments and compared against the performance found in the in-sample testing.

Previous literature that conducts backtesting of trading strategies largely utilizes a bootstrapping methodology to generate randomized samples of the underlying, allowing re-sampling. The concern in our research was that this would eliminate the order of returns within each underlying instrument and significantly hamper the instances of autocorrelation. In terms of prior literature, the Brock et al. (1992) approach which involves fitting null models to the data, generating random bootstrapped series and comparing the profits generated from running the rules on the original commodity series to the profits generated the random series. The most prevalent technique in modern academia is the Whites Reality Check, and its subsequent derivations and improvements, and is recommended for future research in improving the robustness of the adjustment for the data-snooping bias. (Sullivan, Timmerman & White, 1999)

Look Ahead Bias

Haugen and Baker (2006) describe the look-ahead bias in stocks as occurring when data items are used as predictive factors, but the values were unknown when the predictions would have been made. They give an example of the earnings-to-price ratio being used as a predictive factor, but the ratio is calculated with an earnings number that was not actually reported at the date of the prediction, leading to an exaggerated effectiveness of the factor, despite it having little or no real-time worth due to a lack of true predictive information at the time of forecasting.

In order to mitigate the look-ahead bias, the Bloomberg database was used to gather the data as Bloomberg only updates information once it becomes public knowledge. Thus data items can be used as predictive factors because they were public knowledge when forecasting would have occurred. Secondly, as the study largely deals with one data item (price) and not a myriad of factors in a forecasting model, the effect of the look-ahead bias is further mitigated to some degree. Lastly, the previous day's high, low and closing prices are used in forecasting entry and exit signals for the following day. These cumulative factors ensure that this bias is largely immaterial.

Survivorship Bias

If a database systematically excludes significant numbers of firms (or futures contracts and derivative instruments in this case) that have become individually inactive, Haugen and Baker (1996) suggest that the data can be said to suffer from survival bias. They explain that if one observes the performance of only those companies that remain listed, one will most likely find that the survivors' performance exceeds that of the market. If the factors used in prediction are somehow related to the probability of becoming inactive, failure to include the inactive firms in the database would result in misleading estimates of significance and predictive power.

The study sample fortunately excludes listed equities, meaning that a survivorship bias is mostly not applicable. The nature of commodity futures is that they generally have a longer term of existence than their equity counterparts. Furthermore,

the time-period of the study is not long enough for a survivorship bias to have been introduced given that futures contracts commodities and currencies generally trade for significant periods and do not 'fail' in of themselves. Equity indices are susceptible to this but no indices were removed in the period tested. Lastly, the research is being conducted on an individual basis in determining the feasibility of the trading strategy on the instruments in a forward-looking manner, so survivorship bias should be immaterial. This may however arise if a portfolio approach is taken.

Rollover Bias/Contract issues

What has not been accounted for in our model is the potential roll-over gains or losses found when having to roll forward ones futures position at the expiration of the contract to the next actively traded contract should one want to maintain ones position in that instrument. Our model utilizes underlying spot price data to construct a futures contract time series using the disclosed SAFEX leveraging allowances, meaning that roll-over premiums or discounts are not factored into the back-testing methodology. As mentioned previously this is done to increases the accuracy and power of the model.

The literature on the effect of roll yields on trading profitability is scarce. However in examining the price discovery between futures and spot prices, McCollough, Murray & Strydom (2014) studied the effects of contract roll over on constructing futures time series in order to test the price discovery phenomenon. The results indicated that the 1-Day rollover procedure provides greater detail and a more accurate indication of market informational effects, compared with the 'smoothed' 1-month series. As a result, this seems to indicate that the 1-Day rollover would be the preferred construction technique to use.

In using a 1-day rollover procedure, it can be inferred that the rollover gains or losses that occur will not be material to the profitability of a long-term trading model such as ours given the breadth of price movements over a 1-day period on the SAFEX. However this is merely inference and further testing is recommended in this avenue to improve the robustness of the back-testing methodology so as to mitigate the potential roll-over contract bias that arises from using futures data.

4.2. Methodology

This section describes the methodology that is going to be used in our study. Broadly the aim is to employ the Turtle trading method on the JSE Futures Exchange and study the profitability of the method in a South African context. We will evaluate the effectiveness of the method using the Sharpe and Sortino Ratios to detail the relationship between risk and return of the method, as well as a t-test of returns against the benchmark buy-and-hold strategy of the underlying instrument to test for significance and statistical outperformance. The trading strategy will then be configured and optimized for the South African market. As mentioned, the in-sample test of results will be compared to the out-of-sample results of the optimized strategy.

4.2.1. Entry and Exit signals & Trading Systems

The Turtle system relies on two trading systems operating in a symbiotic relationship with one another. The system uses the Donchian Breakout Channels to determine entry or exit signals for long or short trades, in order to identify perceived price trends in a breakout from the predefined channel. The systems were divided by time period, as System 1 used a shorter term 20-day event horizon while System 2 used a longer-term 55-day event horizon, as well as an 'integrated system' combining systems 1 & 2 – meaning 3 systems in total to be tested in our research.

System 1 (S1)

The objective of System 1 is to identify price movements in the market over a relatively shorter time period and capitalize on the identified shorter-term trend. This is achieved by using 20-day breakout channels to identify entry signals. In the case of a *Long* trade, price movements are analysed over a 20-day period, with the highest value over the previous 20 days (the *high*) used as the *'breakout signal'*. A trend is identified once the current day's price surpasses the breakout signal, and the objective of the Turtle system was to capitalize on these trend breakouts and extract as much trading profitability as possible. The converse would be true for *Short* trades; the breakout (or entry) signal would be given once the current day's price surpasses (in this case, falls below) the lowest price over the previous 20 days (the *low*).

Exit signals are provided through the same logic of Donchian Channel breakouts, however are given over a 10-day period. In this regard, a *Long* trade entered into through the current day's price exceeding the *20-day high*. An exit signal is given once the current price fell below the lowest price in the previous 10-days (or the *10-day low*). Again the converse would apply for a *Short* trade, where a trade entered into through the current price falling below the *20-day low*, is exited as the price rose above the *10-day high*.

Trade	**Entry**	**Exit**
Long	20-day High	10-day Low
Short	20-day Low	10-day High

Table 2: System 1 (short-term) Long/Short entry and exit signals

System 2 (S2)

Similarly to System 1, the objective of System 2 is to identify price movements in the market over a relatively longer time period and capitalize on the identified longer-term trend that System 1 did not capture. This is achieved by using 55-day breakout channels to identify entry signals. In the case of a *Long* trade, price movements are analysed over a 55-day period, with the highest value over the previous 55 days (the *high*) used as the *'breakout signal'*. A trend is identified once the current day's price surpasses the breakout signal. The converse would be true for *Short* trades; the breakout (or entry) signal would be given once the current day's price surpasses (in this case, falls below) the lowest price over the previous 55 days (the *low*).

Exit signals are provided through the same logic of System 1 utilizing Donchian Channel breakouts, however they are given over a 20-day period. In this regard, a *Long* trade entered into through the current day's price exceeding the *55-day high*. An exit signal is given once the current price fell below the lowest price in the previous 20-days (or the *20-day low*). Again the converse would apply for a *Short* trade, where a trade entered into through the current price falling below the *55-day low*, is exited as the price rose above the *20-day high*.

Trade	**Entry**	**Exit**
Long	55-day High	20-day Low
Short	55-day Low	20-day High

Table 3: System 2 (long-term) Long/Short entry and exit signals

System 3 (integrated system) - Auxiliary Filter Rules creating an integrated system

While the two systems had their merits as independent systems, the success of the Turtle method rested largely on utilizing the systems in conjunction in order to capture potential price movement trends, both long and short term. Essentially an 'integrated system' was used that connected Systems 1 and 2 together. In order to achieve this, various auxiliary trading rules have been implemented:

1) ***Filter Rule:***

Under System 1, a breakout signal is ignored if the previous breakout signal was a 'winning' trade. Even if the trade was not actually entered into (which was often the case during the 1970s given slippage, edge loss and lack of liquidity in a time where the futures exchanges were not computerized) but was theoretically a winning trade, the following breakout entry signal would be ignored. The reason for this is to mitigate the trading losses incurred from false trends, specifically occurring in the short term horizon where this effect is more prevalent given the shorter term volatility of commodity prices. The issue that this filter rule introduces however is that potential price trends could be ignored if the breakout entry signal is ignored. To address this, another filter rule is introduced:

2) ***Failsafe Entry-point:***

If a System 1 entry is skipped as a result of the Filter Rule (given that a prior trade was a theoretical winner), a trade will still be entered if a breakout entry signal is given under the criterion for System 2 (using the 55-day breakout channels). This serves as the failsafe entry-point, ensuring that potential longer term price trends are not mistakenly ignored as a result of the System 1 filter rule.

Therefore there are 3 systems in essence: System 1 (shorter-term), System 2 (longer-term) and System 3 (the integrated system). These will be tested independently in our research.

4.2.2. Volatility

The Turtle trading system used a position sizing algorithm that was advanced for its time, as it normalized the dollar volatility of a position by adjusting the position size based on the dollar volatility of the market. Normalizing the volatility between the various instruments traded increased the effectiveness of diversification, as trades would tend to have the same chance for a particular dollar loss or a particular dollar gain. Position sizing is actively used today by futures traders and will form the basis of our risk appetite determinant.

This volatility measure was used primarily to calculate position sizing and magnitude of stop-losses implemented for each trade. Referred to as '*N-Volatility'* by the Turtles, it is simply a 20-day exponential moving average of the *True Range* of the share price over the same period. More commonly known today as the *Average True Range (ATR)*, conceptually it demonstrates the average range in price movement over a 20-day period that a particular market makes in a single day. Calculated as:

True Range = *Maximum*(H-L, H- PDC, PDC – L)

H – Current High

L – Current Low

PDC – Previous Day's Close

Date	High	Low	Close	20d HIGH	20d LOW	10d HIGH	10d LOW	TR	ATR	20d ATR
01/02/06	3301.03	3241.20	3247.33	20	-	10			64.96	20
01/03/06	3332.01	3266.82	3331.96	-	-	-	-	84.67	64.96	-
01/04/06	3334.08	3260.11	3287.49	-	-	-	-	73.97	63.13	-
01/05/06	3301.57	3222.53	3229.03	-	-	-	-	79.03	62.61	-
01/06/06	3285.91	3220.52	3276.49	-	-	-	-	65.39	61.26	-
01/09/06	3335.84	3261.27	3319.70	-	-	-	-	74.56	61.36	-
01/10/06	3333.92	3289.36	3299.97	-	-	-	-	44.56	60.90	-
01/11/06	3343.04	3278.93	3282.27	-	-	-	-	64.11	64.83	-
01/12/06	3330.27	3268.87	3323.08	-	-	-	-	61.40	64.54	-
01/13/06	3369.73	3302.47	3360.08	-	-	**3369.73**	3220.52	67.26	65.15	-
01/16/06	3381.61	3341.17	3376.86	-	-	**3381.61**	3220.52	40.44	67.69	-
01/17/06	3388.54	3327.42	3336.30	-	-	**3388.54**	3220.52	61.11	69.73	-
01/18/06	3365.62	3281.41	3283.31	-	-	3388.54	3220.52	84.21	69.87	-
01/19/06	3351.00	3272.66	3330.49	-	-	3388.54	3220.52	78.35	71.33	-
01/20/06	3399.20	3320.66	3328.34	-	-	**3399.20**	3261.27	78.54	70.47	-
01/23/06	3360.38	3299.32	3334.87	-	-	3399.20	3268.87	61.06	69.10	-
01/24/06	3376.34	3319.03	3366.83	-	-	3399.20	3268.87	57.30	68.27	-
01/25/06	3421.18	3352.81	3403.92	-	-	**3421.18**	3268.87	68.37	67.37	-
01/26/06	3427.57	3384.29	3420.67	-	-	**3427.57**	3272.66	43.28	66.06	-
01/27/06	3447.19	3389.04	3439.17	**3447.19**	3220.52	**3447.19**	3272.66	58.15	65.91	64.96

Figure 1: Snapshot of the Gold trading model highlighting entry and exit signals for System 1

From Figure 1 above, from the Gold commodity model, the High, Low, and Closing prices are detailed in their respective columns with the 20-day Highs (Long) and Low (Short) Entry triggers calculated alongside. The Exit values, being the 10-day Highs (Short) and Lows (Long) are also calculated. The True Range (Column 'TR') has been calculated for each trading day with the Average True Range (Column 'ATR') calculated alongside.

$$\mathbf{N} = \frac{(19 \text{ x PDN} + \text{True Range})}{20}$$

PDN – Previous Day's N-Volatility Measure

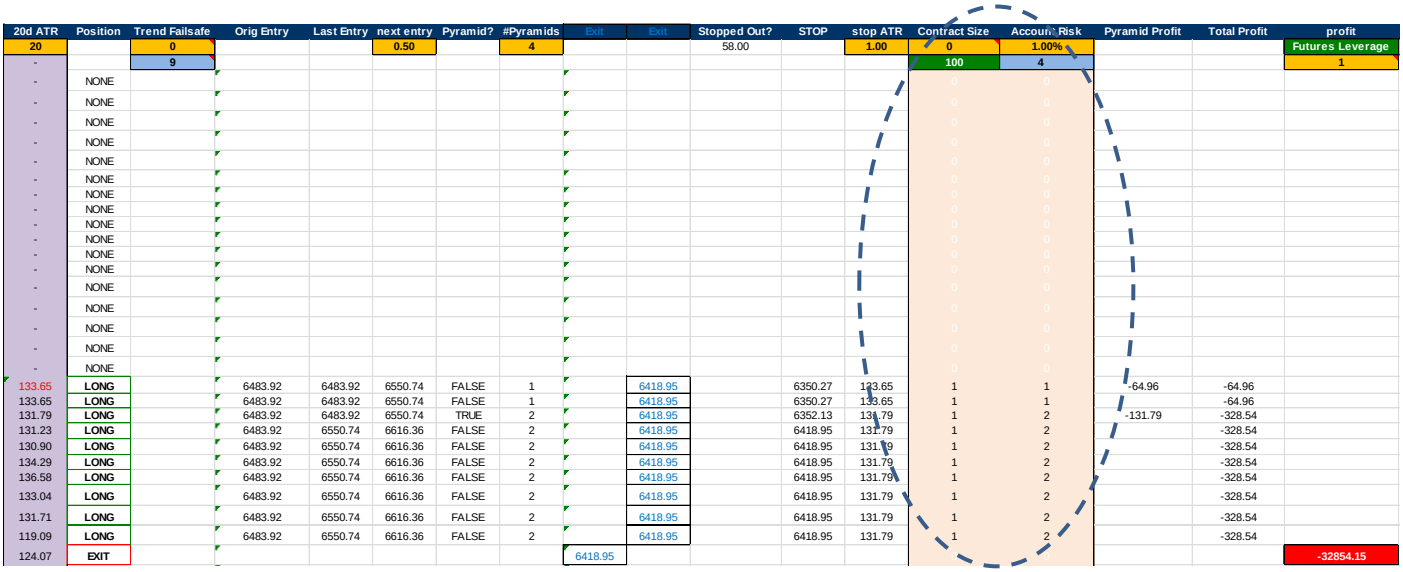
True Range – Current Day's True Range

Dollar Volatility = *N* x Dollars per Point

Essentially this simply calculates a 20-day average of the previous *True Range* values to compute an *Average True Range* which is used as the *'N-Volatility'* measure. As mentioned, this calculation is crucial in determining effective position sizing within the trading strategy. In the case of the Turtle Strategy, the Dollar Volatility represented how risky the contract was in dollar terms. A standard corn contract, worth $50 per point movement (cent in this case), with an "N" measure of 7 cents, would have a risk of (7 cents x $50) $350.

Determining the number of contracts to buy or sell was then found by taking the account risk traded divided by the contract risk of the instrument. The original method began with a 2% account risk level, but large trading events that shook the capital balances of the Turtle traders pushed them to adopt a 1% risk level for the majority of their trading tenure, which the level used in our model initially as the initial default input.

Figure 2: Position sizing methodology being used to determine the maximum allowable tradeable units



20d ATR	Position	Trend Failsafe	Orig Entry	Last Entry	next entry	Pyramid?	#Pyramids	Exit	Exit	Stopped Out?	STOP	stop ATR	Contract Size	Account Risk	Pyramid Profit	Total Profit	profit
20		0			0.50		4			58.00		1.00	0	1.00%			Futures Leverage
-		9											100	4			1
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
-	NONE												0	0			
133.65	LONG		6483.92	6483.92	6550.74	FALSE	1		6418.95		6350.27	133.65	1	1	-64.96	-64.96	
133.65	LONG		6483.92	6483.92	6550.74	FALSE	1		6418.95		6350.27	133.65	1	1		-64.96	
131.79	LONG		6483.92	6483.92	6550.74	TRUE	2		6418.95		6352.13	131.79	1	2	-131.79	-328.54	
131.23	LONG		6483.92	6550.74	6616.36	FALSE	2		6418.95		6418.95	131.79	1	2		-328.54	
130.90	LONG		6483.92	6550.74	6616.36	FALSE	2		6418.95		6418.95	131.79	1	2		-328.54	
134.29	LONG		6483.92	6550.74	6616.36	FALSE	2		6418.95		6418.95	131.79	1	2		-328.54	
136.58	LONG		6483.92	6550.74	6616.36	FALSE	2		6418.95		6418.95	131.79	1	2		-328.54	
133.04	LONG		6483.92	6550.74	6616.36	FALSE	2		6418.95		6418.95	131.79	1	2		-328.54	
131.71	LONG		6483.92	6550.74	6616.36	FALSE	2		6418.95		6418.95	131.79	1	2		-328.54	
119.09	LONG		6483.92	6550.74	6616.36	FALSE	2		6418.95		6418.95	131.79	1	2		-328.54	
124.07	EXIT							6418.95									-32854.15

In Figure 2, one can see the maximum allowable tradeable units for the gold instrument have been calculated using the formula below:

$$\textbf{Max. unit per trade} = \frac{\%\ \text{account risk}}{\text{Market Volatility}}$$

% account risk – Predetermined, variable rate. Initially set at 2% but later reduced for risk management purposes to 1%

$$\textbf{Max. unit per trade} = \frac{1.00\% * \text{R}100{,}000}{133.65\ (\text{ATR}) * 100(\text{R's per point})}$$

Integer value = 0 (rounded up to 1)

Although the integer value was 0, only 1 allowable contract unit is to be traded for this particular day's trade given the amount of capital on hand, and the amount of risk the trader is willing to take on. As pyramids are added to the trade (discussed later) the maximum units are calculated for each trading day and inputted into the maximum allowable entries of that trade. (i.e. a pyramid entry with 1 maximum unit will only add 1 entry to the trade)

This draws on the work of Vince (1990) and Anderson & Faff (2004) mentioned previously, however the *optimal f* methodology is substituted with the *market volatility* measure (ATR*ZAR per point) given that notional amounts of capital were used thus making it difficult to estimate an accurate largest observed loss and hence the *optimal f* point. Again this is an avenue for further potential research. The original Turtle methodology regarding capital sizing was unclear as to the

calculation of the number of contracts to be traded, and used terminology and techniques that were only appropriate for a market where trade orders were conducted through a broker (i.e. they tried to minimize order 'slippage', the delay between entry/exit prices they calculated and actual market prices received once the order was executed) thus conventional contract position sizing elements have been incorporated here.

The number of contracts to trade is calculated by dividing the allocated capital for each trade by the contract volatility of each futures contract. This market volatility is found by multiplying the N-volatility figure (ATR) by the leverage allowed by the futures contract, thereby identifying the volatility of each futures contract. Essentially this formula applies the tenets of a fixed fraction asset allocation methodology by using a constant account risk level, while encompassing the techniques of the Turtle methodology in employing the volatility measure to identify the contracts required to trade so as not to exceed the volatility of that specific futures instrument. The maximum allowable number of units was determined by the correlation of the markets.

4.2.3. Correlation & Markets

When trading a portfolio of contracts, risk is introduced with the issue of markets displaying correlation. Trading in one market exposed one to some form of underlying unit risk. However trading in closely positively-correlated markets doubled ones exposure without the resultant increase in potential returns. (Trading gold commodities and the Gold Mining Index is an intuitive example of this).

Therefore risk management rules were implemented in the original Turtle model to limit the number of units traded in particular markets to mitigate downside risk effects, seen in Table 3. To determine the level of correlation in the tradeable markets, a correlation matrix (Appendix 1) was constructed from the daily returns of the underlying instruments to determine the level of correlation present. Once identified, the maximum risk allowable for each market trade was given as:

Level	Type	Maximum Units tradeable
1	Single Market	4 units
2	Closely correlated markets	6 units
3	Loosely correlated markets	10 units
4	Single Direction – Long or Short (Max)	12 units

Table 4: Market correlations vs. strategy position sizing

The risk management policy clearly demonstrates an inverse relationship between the correlation between markets and the maximum number of units tradeable in those markets. This can be applied to a portfolio holding methodology in determining an optimal portfolio for the South African market, being especially pertinent given the significant presence of correlation on the JSE as well as concentration risk arising from the market dependence on the resources sector. Very highly positively-correlated markets would not be included in the same portfolio given the inherent risk this introduces, while negatively-correlated markets could be used for risk mitigation purposes.

Correlation matrices were constructed in order to implement the risk mitigation procedures detailed above in our model (Appendix 1). The tests were initially conducted separately across the individual sector data, given the high probability of

correlation present within each sector. This would be fundamental to traders of the system looking to construct diversified portfolios of the various commodities and instruments. A matrix was also constructed for all the available instruments in order to test correlations across markets, again in order to determine risk mitigates and levels of diversification needed.

Correlation tests were conducted on the most recent 6-year period of data, as this was comparable and available across all sectors. This would provide more accurate approximations of the levels of prices movements in markets on the back of market-disrupting events such as the 2008 subprime mortgage crisis or the more recent oil price rout. While these may well be affected by cyclicality or seasonality to some degree, the results are useful in determining the applicability and profitability of using recent price movement data against longer-term data in order to best mitigate risks across markets.

Level	Type	Max Units	Format	Correlation
1	Single Market	4 units	0.953	>0.85
2	Closely correlated markets	6 units	0.918	0.849 – 0.50
3	Loosely correlated markets	10 units	0.836	0.499 – 0.00
4	Single Direction – Long or Short (Max)	12 units	-0.398	Negative

Table 5: South African market correlations vs. strategy position sizing

Figure 3: Currency market correlation of daily returns to determine position sizing in a trading portfolio

	ZARJPY	AUDZAR	BWPZAR	CADZAR	CHFZAR	CNYZAR	EURZAR	NZDZAR	POUNDZAR	TKLZAR	USDZAR
ZARJPY	1.000										
AUDZAR	-0.512	1.000									
BWPZAR	-0.053	0.058	1.000								
CADZAR	-0.703	0.750	0.091	1.000							
CHFZAR	-0.837	0.612	0.064	0.743	1.000						
CNYZAR	-0.058	0.079	0.762	0.089	0.066	1.000					
EURZAR	-0.085	0.095	0.680	0.099	0.109	0.826	1.000				
NZDZAR	-0.550	0.852	0.079	0.737	0.633	0.075	0.106	1.000			
POUNDZAR	-0.094	0.100	0.693	0.107	0.117	0.842	0.869	0.112	1.000		
TKLZAR	0.006	0.042	0.476	0.021	0.008	0.596	0.559	0.042	0.564	1.000	
USDZAR	-0.069	0.077	0.759	0.092	0.076	0.983	0.837	0.072	0.857	0.595	1.000

Although no indication is given by the Turtle method, Table 4 dictates the correlation constraints assumed to be applicable in our model and Figure 3 details the results of a currency market. As stated, the correlation analyses is utilized to mitigate downside risk when trading across multiple markets, however this is in the case where a trader has a portfolio of instruments being traded at a time. Ergo, while the correlations are useful when holding a portfolio of futures contracts, the analysis is not significant for our back-testing and optimization objectives as we are analysing the entire South African futures market to determine the applicability of this trading strategy.

Since portfolio testing is not being conducted, the initial back-testing of the original model sets all markets to a maximum of 4 units tradeable for use as the initial testing methodology.

Future research could be conducted in this field as to the applicability of conducting year-on-year (or month-by-month) rolling correlation tests that would help forecast risk mitigates needed for trading in the following period. However the most important aspect in future research would be that of the correlation tests being used in combination with a portfolio

of instruments to construct optimized risk mitigation procedures given the autocorrelation between instruments. In other words, attempting to smooth returns of the model (one of the major drawbacks of the Turtle method was its volatile return profile) by over- and under-weighting certain instruments given their price correlations would be tantamount to future success of this model on an institutional level given the results found and the highly volatile nature of the strategy.

4.2.4. Pyramiding trades

"Pyramiding" was the trading jargon used to describe adding units to a trade that has already been entered in order to capitalize on trending price movements. When to add additional units to your original entry was determined by your Average True Range (hence, your "N-volatility") and its distance from your original entry price.

Turtles entered single positions at the breakouts and added to those positions at ½ N intervals following their initial entry, with the interval being based on the price of the previous order. So if an initial breakout order slipped by ½ N, then the new order would be 1 full N past the breakout to account for the ½ N slippage, plus the normal ½ N unit add interval. This would continue right up to the maximum permitted number of units, in which the Turtles used a maximum of 4 pyramid units. While the terminology is inherently confusing, the methodology is made simpler by way of an example in Table 6:

Gold	**Quantum**
N = 2.50	
55-day breakout = 310	
First Unit added	310.00
Second Unit	310.00 + ½ 2.50 or 311.25
Third Unit	311.25 + ½ 2.50 or 312.50
Fourth Unit	312.50 + ½ 2.50 or 313.75

Table 6: Adding trades to positions ('pyramiding') - working example

Figure 4: 20-day ATR used to determine the additional trades to add to a position ('pyramiding')

20d ATR	Position	Trend Failsafe	Orig Entry	Last Entry	next entry	Pyramid?	#Pyramids
20		0			0.50		4
-		10					
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
-	NONE						
64.96	LONG		3418.12	3418.12	3450.60	FALSE	1
64.96	LONG		3418.12	3418.12	3450.60	TRUE	2
63.13	LONG		3418.12	3450.60	3482.16	FALSE	2
62.61	LONG		3418.12	3450.60	3482.16	FALSE	2
61.26	LONG		3418.12	3450.60	3482.16	FALSE	2
61.36	LONG		3418.12	3450.60	3482.16	FALSE	2
60.90	LONG		3418.12	3450.60	3482.16	FALSE	2
64.83	LONG		3418.12	3450.60	3482.16	FALSE	2
64.54	EXIT						

In Figure 4, our model initially uses 0.5 N (or ½ the 20-day ATR level in this case) to determine the next entry. In this case, the next entry is 3450.60 (the original entry being 3418.12, therefore the higher entry figure denoted by the LONG position taken in the trade determined by the 20-day high and low levels). As the price level reaches the next entry criteria, the trigger for a pyramid entry is hit (denoted by the "TRUE" signal in the model) and a unit is added to the trade, with the following entry (3rd pyramid) calculated using that days N-volatility.

Initially in testing ½N volatility was used to determine the pyramid entries as part of the model and will be stress tested in the backtesting process.

4.2.5. Stop-loss orders

In order to better mitigate risk, the model utilized position risk and our N-volatility measure to place stop-loss orders on trades. These stop-orders would be enacted if the price movement levels coincided with the stop-loss order, before the 10-day High or Low Exit triggers were met (in the case of System 1). In other words the stop-loss order would take priority over the Exit signal and would generate an exit order immediately if the stop-loss was triggered. The original Turtle traders did not initiate these stop-orders with brokers however as they did not want their trade positions to be known by the market, so these stop-orders were self-policed by the traders as an additional risk mitigant.

For example, a simple illustration of the stop-loss system as more units are added to a trade can be seen in Table 7:

Crude Oil	**Entry Price**	**Stop**
N = 1.20		
55-day breakout = 28.30		
First Unit	28.30	25.90
First Unit	28.30	26.50
Second Unit	28.90	26.50
First Unit	28.30	27.10
Second Unit	28.90	27.10
Third Unit	29.50	27.10
First Unit	28.30	27.70
Second Unit	28.90	27.70
Third Unit	29.50	27.70
Fourth Unit	30.10	27.70

Table 7: Position risk mitigation through introducing stop-loss orders - working example

This was built into our model, with the 'Stop-ATR' indicating the amount used in calculating the stop-loss order price level ('STOP').

Figure 5: System 1 stop-loss mechanism triggering an exit signal before the 10-day exit signal

20d ATR	Position	Trend Failsafe	Orig Entry	Last Entry	next entry	Pyramid?	#Pyramids	Exit	Exit	Stopped Out?	STOP	stop ATR
20		0			0.50		4			96.00		1.00
-		10										
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
-	NONE											
64.96	LONG		3418.12	3418.12	3450.60	FALSE	1		3385.64		3353.15	64.96
64.96	LONG		3418.12	3418.12	3450.60	TRUE	2		3385.64		3353.15	64.96
63.13	LONG		3418.12	3450.60	3482.16	FALSE	2		3385.64		3385.64	64.96
62.61	LONG		3418.12	3450.60	3482.16	FALSE	2		3385.64		3385.64	64.96
61.26	LONG		3418.12	3450.60	3482.16	FALSE	2		3385.64		3385.64	64.96
61.36	LONG		3418.12	3450.60	3482.16	FALSE	2		3385.64		3385.64	64.96
60.90	LONG		3418.12	3450.60	3482.16	FALSE	2		3385.64		3385.64	64.96
64.83	LONG		3418.12	3450.60	3482.16	FALSE	2		3385.64	STOPPED OUT	3385.64	64.96
64.54	EXIT							3385.64				

In the above Figure 5, our model for the gold commodity, only 2 entries have been made with the stop-loss orders being implemented at 1 N of the order entry's Average True Range (64.96 in both entries cases, being the original and the additional pyramid entry). As the Long position was entered, the stop-orders are implemented at 1 * ATR (64.94) less than the original entry price and any subsequent entries. The stop-loss order was struck as the price level declined below the stop-order on the 2nd additional unit entered of 3385.64 and an exit order was enacted before the 10-day exit signal was generated.

The amount of the stop-loss volatility level to use in executing the stop-loss orders in this model is an avenue that would benefit from further research as risk mitigation in relation to this strategy is vital to its success and potential commercial use. A larger N-volatility value (which implies a greater price level away from the original entry price) provides the ability to remove the noise of false signals in the market and is more forgiving to price 'bounce' (sharp peaks and troughs in a heavily traded market), thereby allowing a trader to ride a position longer when the price dips falsely in the midst of a profitable long-position trend over the longer-term. The corollary to that is that if the price decline is in fact not a false signal, but a longer-term downward trend in the market, the stop-loss exit point is at a relatively lower price point causing any prior profits made to be eroded by the lower stop-loss exit price.

Our model is initially tested using the 1N volatility stop-loss order with an account risk of 1%. Although the original Turtle traders used 2N with a 2% account risk at the onset of their trading the system, this was eventually lowered to the 1N/1% system constraints after bouts of market volatility leading to significantly large trading losses incurred by some of the Turtles. Dennis and Eckhardt decided to cap their traders position size risks in order to better mitigate the losses they suffered, with the 1N/1% rule becoming the staple trading constraint for the Turtles over the majority of their tenure.

4.3. Back-testing Methodology

Broadly, the methodology entails testing System 1, System 2 and the integrated system separately across the initial testing time periods to determine historic performance results in an attempt to identify suitable markets to trade in in a South African context. The strategy is tested across two periods, in-sample and out-of-sample. The in-sample period is used to determine historic performance and thus determine suitable optimization of the model (discussed in Section 4.4) to then be tested on the out-of-sample period. The following outline serves to illustrate the methodology in a more comprehensive manner:

4.3.1. Data Inputs

Table 8 below highlights the inputs used across the sectors in the initial testing of the trading strategy in the in-sample period. A notional amount of ZAR100,000 was used in the beginning of the strategy testing and this opening amount is not altered throughout testing.

Sector	Entry days	Exit days	ATR stop-loss	ATR pyramid	Account risk	Max. pyramids per trade
Agriculture						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Currencies						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Energy						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Equity Indices						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Precious Metals						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4

Table 8: Trading strategy initial inputs used in backtesting over historic data

4.3.2. Testing and collation of results

This step involves the actual back-testing stage and collation of results. As described in Section 4.2, the trading model is tested using the:

- **In-sample period:** Initial period dataset where stress tests are conducted based on historic performance

And then re-tested after the optimisation analysis has been conducted, with the strategy being implemented on the subsequent test period:

- **Out-of-sample period:** Testing done on the period from 2012 – 2014

The in-sample and out of sample tests are conducted separately on the three systems being:

- **System 1 (shorter-term)**
- **System 2 (longer-term)**
- **System 3 (integrated system)**

Although out-of-sample testing is not a perfect solution by any means, historic data is used to assess the performances of underlying instruments in futures contracts by using the monthly and yearly returns of the trading strategy against the benchmark returns of a buy-and-hold strategy in the underlying instrument as the basis of comparison. These returns are drawn from the notional amount of ZAR100,000 traded in each instrument across the entire time period of available data, where t-tests and Sharpe and Sortino Ratio analyses are conducted to assess the performance of each individual instrument. The idea is to determine the feasibility of the Turtle and Optimised Turtle trading strategy in the South African market of each individual underlying instrument and possibly arrive at a portfolio of optimal instruments where further investigation could be conducted in future research as to the performance of this hypothetical portfolio of futures.

4.3.3. Performance measures

Some considerations and analysis was needed to determine to most appropriate method of measuring the performance of our trading model for each instrument tested. This was particularly important given that a portfolio method was not adopted in our methodology.

Cumulative Annual Growth Rate

In order to empirically compare and test the effectiveness of the model on individual contracts, data for each contract is concatenated over yearly periods across the spectrum of available data and a cumulative annual growth rate (CAGR) is used to compare the notional performance of each respective instruments futures contract. Apportioning each individual sample set into equal periods (whether it be over 15 or 5 years) ensures that performance results are comparable to some extent. As the model relies purely on pricing data and attempts to forecast trending patterns, the performance of the model should not be biased across differing time periods in theory, as the probability of success of identifying trends in underlying instrument prices should be constant throughout the time periods. Although in practice this is not the case (a market crash in the oil price, or a severe global drought in corn would skew the returns favourably for that instrument for example), as the periods will differ in performance results due to extenuating circumstances that may incorrectly favour a market for selection in future testing. It may also be said that these extenuating circumstances are prevalent on a global

scale, and not confined to one market in particular, thereby mitigating any bias in future selection to some extent. Although some markets will be more volatile in price movements, or be more privy to extenuating circumstances that affect the price movements of their underlying instruments, it should be these markets that would naturally favour selection of future trading given their constant susceptibility to extenuating circumstances that impact the volatility that allow the underlying instruments provide satisfactory performance results in any case.

As the CAGR is derived over the notional amounts of the contracts, there are some caveats to the results that are detailed in Section 5.1.1.

Sharpe Ratio

$$\mathbf{S} = \frac{(\mathrm{Rp} - \mathrm{Rf})}{\sigma p}$$

Rp = the monthly return of the trading strategy in our case

Rf = the risk-free rate, being an average of 8% over the 1996 – 2012 period, converted to monthly return

$\boldsymbol{\sigma p}$ = the standard deviation of returns of the strategy at hand

The Sharpe Ratio is a widely accepted measure of performance that aims to measure the desirability of a risky investment strategy or instrument by dividing the average period return in excess of some risk-free rate by the standard deviation of the returns of the tested instrument. Devised in 1966 as a measure of performance for mutual funds, it has some value as a measure of strategy "quality" given some level of risk, but it also has a few limitations.

A concerning issue given the structure of our trend-breakout based trading model is that the Sharpe ratio does not distinguish between upside and downside volatility. In fact, high outlier returns have the effect of increasing the standard deviation more than the value of the numerator, thereby lowering the value of the ratio. Rollinger & Hoffman (2014) highlight this in showing that for a positively skewed return distribution such as that of a typical trend following strategy, the Sharpe ratio can be increased by removing the largest positive returns which is counterintuitive as investors generally welcome large positive returns. Therefore to the extent that the distribution of returns is non-normal, the Sharpe ratio generally struggles to add power to a robust performance measure metric. It is a particularly poor performance metric when comparing positively skewed strategies like trend following (or to negatively skewed strategies like option selling). From the reasoning above, it can be inferred that in certain cases of negatively skewed return distributions, a strategy is actually more risky than the Sharpe ratio suggests as risk is understated. This is particularly the case for positively skewed return distributions, where performance is actually achieved with less risk than the Sharpe ratio suggests.

From the above, it would seem that the Sortino ratio is a more suitable fit for our back-testing methodology, especially when measuring and comparing the performance of a model that exhibits skewness in the distribution of returns such as a trend-breakout trading model. The Sortino ratio is a modification of the Sharpe ratio but uses downside deviation (instead of standard deviation) as the measure of risk. This is important in evaluating the performance of an active trading model that needs to be benchmarked against the alternative of a buy-and-hold strategy in the underlying commodity. In this case,

only returns falling below a specified benchmark or required rate of return are considered risky. As such both the Sharpe and Sortino Ratios will form an integral part of our performance metrics

In our research, the benchmark Sharpe ratio of the underlying instrument will be compared against the ratio of the instrument traded with the strategy. In order to make these metrics comparable, the average of the monthly return against the monthly risk-free rate will be used across the testing periods for both benchmark and trading strategy, over the standard deviation of those returns. This is done because of the irregular instances of returns with the trading strategy, and the significant returns achieved in some instances leading to inflated and incomparable ratios. This method better standardizes the metrics for comparative purposes.

Sortino Ratio

$$\mathbf{S} = \frac{(R - T)}{TDD}$$

R = the average period return

T = the target or required rate of return for the investment strategy under consideration. In Sortino's early work, T was originally known as the minimum acceptable return, or MAR. In his more recent work, MAR is now referred to as the Desired Target Return. In our model this is the comparative year's buy-and-hold return used as the benchmark return, and converted to a monthly growth rate. This is used in comparison with the month-on-month returns of the trading model given the nature of returns (where some months would go by untraded).

TDD = the target downside deviation. The target downside deviation is defined as the root-mean-square, or RMS, of the deviations of the realized returns underperformance from the target return where all returns above the target return are treated as underperformance of 0.

$$\sqrt{\frac{1}{N}\sum_{i=1}^{N}(\text{Min}(0, Xi - T))^2}$$

Where:

Xi = ith return

N = total number of returns

T = target return

Monthly returns will also be used in this case, following the same logic described above in the Sharpe ratio.

4.4. Model Optimization methodology

This section details the methods employed in order to optimize the original Turtle trading model. The research conducted is by no means exhaustive; however the most pivotal aspects identified within the model are the subject of the optimization testing and should largely provide a robust indication of a more suitable trading model for use on the South African Futures Exchange.

Of course within each section tested, more in-depth statistical testing could be employed in further research of the topic in order to more accurately determine the suitability of the model constraints in a South African context. The objective of this research is to open the door to further academic research in the use of technical analysis in the South African market, as well as gauge the profitability of implementing and developing trading models for the South African market, which have been successfully employed in more mature financial markets

4.4.1. Stress testing and sensitivity analyses on in-sample period

Although the research is a study of technical analysis on the South African financial market largely, it is specific to a trading model that utilizes true range breakouts and Donchian-esque channels to identify price trends. The optimization procedure was therefore limited to keeping the trading model within its original form in order to test the profitability of this specific trading technique on the South African market. In effect this means that the intrinsic structure of the model was kept intact, with variability introduced to those structures without altering the fundamental core of the model. As the model employs channel breakouts with an ATR volatility system, it was necessary that these aspects remain within the model, with quantitative variability introduced in our sensitivity analysis.

The initial stage of optimizing the model involved conducting sensitivity analyses on the fundamental pillars of the trading method on the in-sample period:

- The number of days used in Entry and Exit triggers
- The ATR values used in determining the next entry/pyramid and stop-loss price levels

As discussed, in first developing the Turtle trading method, Dennis's background on the trading floor combined with the advanced mathematical acumen of Eckhardt allowed the two to develop and determine the ideal criterion for the use of their model on the Wall Street stock market during the 1970s and 80s. Although the literature is sparse at best as to how the pair arrived at these criterion, the issue is clear that they were best suited for the type of market they traded in (being an 'analogue' market in the developed world as the advent of electronic trading had not yet arrived) as well as the period (being 30 – 40 years prior, the markets were significantly different to today across innumerable facets). While the initial testing is necessary to assess the original implementation of the model on the SAFEX, the clear issue is that the model was built and designed for use in the United States stock market over 30 years ago. The reasoning and testing done behind why a 20-day entry point and 10-day exit point is appropriate, for example, is outdated and the same design process needs to be conducted in a South African context to improve the suitability of the model in this market.

The following analyses were conducted in light of this:

Entry & Exit days

As discussed, Systems 1 (20-day entries and 10-day exits) and 2 (55-day entries and 20-day exits) of the original model were suitable for a different period in financial markets. The exact number of days used in the shorter-term and longer-term trading systems was identified by Dennis and Eckhardt after assumedly a number of tests and amendments. Therefore sensitivity analysis is appropriate in this regard, as we introduce variability into the model through altering the number of days used in the trading system. This does not modify the fundamental structure of the trading method, yet still tests against the original methodology as to whether more suitable entry and exit days can be identified which improve profitability.

Analysis 1

The sensitivity analysis was initially conducted against the CAGR of the full dataset for each individual instrument. This would encompass the entire variability of the entry and exit triggers of the instrument, thereby smoothing the results over the time period of available data. The effect would be to provide entry and exit points that are applicable 'more often than not' for each particular instrument. The ability to test sensitivities over a more recent timeframe that would better forecast entry and exit points applicable based on some independent variable is out of the scope of this research but would add significant value to the power of the model.

Figure 6: Entry and exit signals sensitivity analysis on in-sample historic data EXPLAIN GREY

CAGR	Entry days																	
11.2%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
Exit days 1						2.3%	2.9%	1.9%	2.7%	2.5%	2.7%	3.0%	3.0%	3.0%	2.9%	2.4%	2.4%	1.3%
3						26.3%	24.7%	23.1%	23.2%	22.0%	22.3%	22.4%	21.8%	21.6%	21.0%	18.1%	17.0%	15.3%
5	52.2%					24.7%	19.6%	19.4%	18.9%	18.6%	17.7%	17.8%	18.2%	20.0%	19.9%	17.5%	17.2%	16.1%
10	50.3%					11.2%	8.7%	9.8%	9.4%	9.9%	9.6%	9.9%	9.6%	10.5%	11.5%	10.4%	11.7%	11.7%
15	48.6%					19.4%	12.4%	12.8%	12.6%	16.1%	13.2%	13.7%	13.6%	14.9%	15.7%	14.4%	16.0%	16.2%
20	49.1%					26.9%	21.8%	22.9%	23.0%	24.9%	23.8%	24.3%	23.4%	24.2%	25.1%	21.5%	23.1%	25.4%
25	49.1%						33.7%	34.3%	34.1%	35.0%	34.5%	34.7%	34.3%	34.7%	35.2%	24.2%	25.8%	27.2%
30	48.4%							31.7%	31.6%	32.9%	32.3%	32.5%	32.0%	32.4%	33.1%	20.8%	22.6%	24.3%
35	47.6%								32.9%	33.2%	33.5%	33.7%	33.2%	33.6%	34.2%	23.1%	25.0%	26.6%
40	47.9%									38.4%	38.6%	38.7%	38.4%	38.7%	39.1%	31.6%	32.7%	33.8%
45	46.8%									38.4%	38.2%	38.4%	38.0%	38.1%	38.6%	30.8%	32.0%	33.1%
50	47.1%											38.6%	38.2%	38.3%	38.8%	31.1%	32.1%	33.2%
55	46.7%												38.0%	38.1%	38.6%	30.8%	31.9%	33.0%
60	45.4%													36.6%	37.1%	28.6%	29.8%	30.9%
65	44.7%														38.2%	30.1%	30.9%	32.1%
70	42.8%															28.9%	29.7%	31.0%
100	19.7%																25.6%	26.6%
200	11.9%																	27.9%

The above Figure 6 details the sensitivities of the entry and exit points against their relative effects on the CAGR of the instrument tested (gold in this case) over the full period dataset. The colour-scale moves from red for poorer performance and green for greater performance, with the grey areas denoting high negative values or failures in the model. This arose as the Average True Range (ATR) was held constant at 20-days ensuring that entry values below this 20-day ATR hurdle would cause the model to fail as there was no ATR available to be used to calculate pyramid entries, position sizing, stop-loss points etc.

It can be inferred from the above green area that there is a general trend of a higher entry point value combined with a lower exit value corroborates to some higher CAGR amount. This must be disregarded as the model is simply using the leveraging of the contracts to track the underlying instrument price, essentially defeating the objective of the research.

Analysis 2

In order to determine which system did not accrue a negative capital base at any stage over the full period dataset, a secondary sensitivity analysis was conducted on the entry and exit points. However in this case, the entry and exit points were tested against the maximum drawdown achieved by the model for each individual instrument on the in-sample period.

Grey areas dictate that the maximum drawdown level reached above 100%. In other words the initial capital amount used was fully drawn and the capital amounts went into negative figures. The analyses are therefore used in conjunction to determine the suitable entry and exit points for each individual instrument, given the results yield a high CAGR value with a capital drawdown not greater than 100% at any stage.

The heat maps in Appendix 8.2 are used to determine the appropriate optimized inputs given the above discussion. Sectorial trends were determined and applied equally to the instruments. More powerful and in-depth analysis is required to apply constraints individually to each instrument, this research rather attempts to test for feasibility of the broader model. The summarized findings of this analysis across all sectors can be found in Section 5.3, which detail the inputs used in the final testing methodology across the out-of-sample period.

Next entry/pyramid ATR & Stop-loss ATR

In a similar fashion, the ATR (and hence N-volatility) levels used for the original Turtle system were suitable during a time of lower price volatility, lower levels of trading liquidity, slower order processing and perhaps lower levels of market efficiency. Therefore sensitivity analysis is again appropriate in this regard, as we introduce variability into the model through altering the ATR levels used in the trading system. The analysis is conducted on the ATR used in determining the price level used in triggering the next entry signal (for pyramiding purposes) and the ATR level used in determining the price levels of the stop-loss orders (for exiting a trade purposes). Again this does not modify the fundamental structure of the trading method, yet still tests against the original model as to whether more suitable ATR levels can be identified to improve profitability.

The sensitivity analysis was conducted against the CAGR of the full dataset for each individual instrument. As posited, this encompasses the entire variability of the entry and exit triggers of the instrument, thereby smoothing the results over the time period of available data with the effect of providing ATR levels applicable 'more often than not' for each particular instrument. The ability to test sensitivities over a more recent timeframe that would better forecast ATR levels applicable based on some independent variable is out of the scope of this research but would add significant value to the power of the model.

Figure 7: ATR sensitivity analysis on in-sample historic data

		Next pyramid/entry ATR																	
	63.0%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
ATR stop	0.025	15.3%	15.2%	15.0%	14.6%	10.6%	10.1%	10.0%	9.3%	7.2%	6.1%	8.5%	7.7%	8.5%	2.7%	5.7%	1.2%	1.0%	1.0%
	0.05	14.5%	14.4%	14.2%	13.9%	9.8%	9.4%	9.0%	8.4%	6.2%	4.6%	7.3%	6.4%	7.3%	0.4%	4.0%	-1.3%	-1.5%	-1.5%
	0.1	15.3%	15.1%	14.3%	13.9%	10.0%	9.2%	8.7%	7.3%	5.1%	2.9%	6.2%	5.6%	6.8%	-2.2%	2.1%	-6.3%	-6.6%	-6.6%
	0.2	36.3%	36.2%	30.6%	30.4%	42.4%	29.2%	28.7%	28.7%	27.9%	26.5%	26.3%	25.6%	19.3%	19.1%	15.3%	14.4%	6.4%	4.2%
	0.4	58.3%	58.2%	58.0%	57.3%	58.0%	55.6%	50.0%	44.6%	43.7%	41.6%	41.6%	43.7%	40.9%	30.8%	33.9%	24.8%	17.4%	10.4%
	0.6	63.6%	63.3%	62.3%	61.8%	60.4%	60.3%	58.6%	55.6%	53.2%	51.4%	45.5%	48.5%	46.0%	42.1%	42.5%	33.3%	19.6%	15.4%
	0.8	67.0%	66.8%	65.9%	64.3%	62.8%	61.8%	60.0%	56.7%	55.0%	49.6%	47.4%	52.9%	52.9%	41.9%	44.1%	33.7%	23.4%	19.7%
	1	68.4%	68.3%	67.2%	66.6%	63.8%	62.1%	60.8%	57.8%	56.2%	53.7%	49.7%	52.1%	53.2%	42.8%	45.2%	37.7%	24.0%	23.5%
	1.2	68.6%	68.5%	68.1%	66.8%	64.7%	62.6%	61.1%	58.9%	57.2%	54.7%	48.3%	52.3%	52.6%	47.1%	44.5%	37.8%	23.6%	22.2%
	1.4	69.3%	69.2%	68.7%	67.9%	66.0%	64.6%	62.4%	62.2%	59.5%	56.1%	53.7%	52.9%	53.2%	51.2%	47.2%	38.5%	23.7%	23.9%
	1.6	69.2%	69.1%	68.7%	67.9%	66.0%	64.6%	63.1%	62.3%	60.8%	56.7%	55.3%	54.0%	53.9%	52.3%	47.6%	37.8%	23.4%	24.0%
	1.8	69.6%	69.4%	68.9%	67.8%	66.0%	65.0%	63.7%	62.3%	61.3%	57.3%	55.0%	55.6%	54.8%	52.1%	45.5%	37.7%	25.4%	24.4%
	2	69.6%	69.4%	68.9%	68.0%	65.7%	64.9%	63.4%	62.7%	60.8%	59.3%	54.5%	55.5%	54.6%	51.3%	45.1%	36.7%	24.9%	23.6%
	2.5	69.2%	69.0%	68.4%	67.6%	66.1%	64.8%	63.3%	61.6%	60.5%	58.5%	57.2%	55.0%	54.1%	52.0%	43.9%	36.0%	24.3%	23.5%
	3	69.2%	68.9%	68.4%	67.6%	66.0%	64.8%	63.1%	61.3%	60.4%	58.3%	56.7%	55.5%	53.7%	51.6%	47.7%	35.4%	24.5%	21.7%
	5	69.2%	69.0%	68.5%	67.6%	65.9%	64.7%	63.1%	61.4%	60.4%	58.5%	56.7%	55.7%	53.8%	51.5%	48.4%	36.1%	23.8%	20.6%
	10	69.2%	69.0%	68.5%	67.6%	65.9%	64.7%	63.1%	61.4%	60.4%	58.5%	56.7%	55.7%	53.9%	51.6%	48.5%	36.1%	23.8%	24.2%
	15	69.2%	69.0%	68.5%	67.6%	65.9%	64.7%	63.1%	61.4%	60.4%	58.5%	56.7%	55.7%	53.9%	51.6%	48.5%	36.1%	23.8%	24.2%

Figure 7 above displays the results of the sensitivity analysis against the CAGR performance over the full dataset for gold where a trend can be inferred from the collection of green areas (indicating high CAGR values). The discussion between using large N-volatility values versus smaller values in determining ones stop-loss price level orders is tested in our model to some degree using sensitivity analyses for each traded instrument. Although it is perhaps not a robust test in determining the profitability of the various stop-order values, nor the causality of those profits against the stops used, it does provide some indication as to the level of appropriateness of utilizing the stops for each traded instrument. While it is posited that smaller N-volatility values, and therefore smaller stop-loss amounts, are more appropriate for intraday traders in order to mitigate trade slippage and larger N-volatility values more appropriate for a longer-term trading system to allow

for bid-ask bounce in instrument prices, our model attempts to provide an indication of where this discussion lies but not an empirical answer. As suggested, further research on this aspect would benefit the risk mitigation elements of the system and hence the subsequent profitability.

The ATR was not tested against entry and exit days as: 1) this would introduce broader data-snooping issues into the model and; 2) the ATR is applicable across the longer-term and shorter-term models and across the sectors, much like the same ATR was used across all sectors in the original model. Again however, this is a caveat to the testing as this is assumed to be true in this research and opens up this field for further testing.

The heat maps in Appendix 8.3 are used to determine the appropriate optimized inputs given the above discussion. Again more in-depth analysis would be needed to apply constraints individually to each instrument. The summarized findings of this analysis across all sectors can be found in Section 5.3, which detail the inputs used in the final testing methodology across the out-of-sample period.

4.4.2. Trend optimization

The main tenets of our trading system revolve around price trend identification, and the methods used to improve profitability once those price trends have actually been identified. More specifically, the success of the trading model is largely dependent on the ability to:

i) Identify price trends in each individual market, be they longer-term price regimes or shorter-term up/down-swings. This was the objective of the aforementioned sensitivity analyses, in attempting to identify the structures of the model that yielded sustainable and profitable results.

ii) Capitalizing on the identified price trends in order to extract the most profitability from those trends at an acceptable level of risk. The success of the original Turtle model hinged on the ability to do exactly this, and do it well. The initial testing against the hypothesis of not utilizing a pyramiding system is not included in this research but available on request. This section will detail the methods stress tested to capitalize on these identified price trends.

Pyramiding & Account risk

The original trading model employed a maximum of 4 pyramids (or additional units of the specified instrument bought at a predetermined price) and a 2% account risk limit (later decreased to 1%) within each trade. Again, the reasoning behind this was appropriate for the period that the Turtles were trading in, where markets were not electronically traded and traders were more susceptible to price slippage (with the inability to react in an efficient manner that electronic trading provides). The effect of these constraints was to ensure that traders did not have highly 'loaded' positions (having taken large positions on the side of a trade with high notional values) that would incur severe losses should the market slip or overreact. Yet as said these were constraints appropriate for a time were risk mitigation was relatively more difficult to execute efficiently. Therefore the pyramiding and account risk constraints were stress tested to improve profitability while maintaining an acceptable level of risk with the results found in Appendices 8.4 and 8.5.

Trend identifier

A caveat built into the model is the idea of a 'trend identifier.' The trend finder functions as an auxiliary filter rule that attempts to identify longer-term trends, evidenced by the length of time a position has been taken in a trade, and add an

additional unit to that trade once that criteria has been met. This is achieved by only allowing an additional unit to be added at a later stage in the trade position, and once the trend has been deemed to be found, capitalize on that by pyramiding one additional allowable trade onto the position.

Figure 8: Trend identification (using a 10-day trading position limit) that increases pyramiding limits

Position	Trend Failsafe	Orig Entry	Last Entry	next entry	Pyramid?	#Pyramids
	1			0.50		4
	10					
NONE						
LONG		4338.77	4338.77	4406.62	FALSE	1
LONG		4338.77	4338.77	4406.62	FALSE	1
LONG		4338.77	4338.77	4406.62	FALSE	1
LONG		4338.77	4338.77	4406.62	TRUE	2
LONG		4338.77	4406.62	4474.89	TRUE	3
LONG		4338.77	4474.89	4542.29	FALSE	3
LONG		4338.77	4474.89	4542.29	FALSE	3
LONG		4338.77	4474.89	4542.29	TRUE	4
LONG		4338.77	4542.29	4606.23	TRUE	4
LONG	trend	4338.77	4542.29	4606.23	TRUE	5
LONG	trend	4338.77	4606.23	4668.74	TRUE	5
LONG	trend	4338.77	4606.23	4668.74	TRUE	5
LONG	trend	4338.77	4606.23	4668.74	FALSE	5
LONG	trend	4338.77	4606.23	4668.74	FALSE	5
EXIT						

The trend identifier filter rule allows one additional unit to be added to the maximum number of pyramids stipulated at the onset of the trading model. The system will trigger the rule after a trader has taken a position (Long in this case, in Figure 8) and 10-trading days have passed without exiting the position. This can be seen in Figure 8 with the 'trend' being identified after 10-days have passed after being Long in our trading position. Although the maximum stipulated number of pyramids allowed is 4 according to our original model (seen in the rightmost column above), the filter rule was activated at the onset of the identified 'trend' and allowed an additional pyramid to be entered, evidenced by the "TRUE" result. This was produced as a function of the instrument price exceeding the stipulated "next entry" price point, being 0.5 times the ATR value of that day (not shown above) greater than the previous entry point, in line with previous discussions on pyramiding in Section 4.2.4.

The number of days required to identify a price trend has also undergone back-testing in order to determine an appropriate length of time to be used.

Figure 9: Determining trends based on historic trading days

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	802	# days LONG	541	# days LONG	812
# days SHORT	542	# days SHORT	266	# days SHORT	556
Total trade days	**1344**	Total trade days	**807**	Total trade days	**1368**
Total # trades	139	Total # trades	73	Total # trades	137
Average position length	**9.7**	Average position length	**11.1**	Average position length	**10.0**

The number of total trading days has been calculated in each system for each individual instrument traded over the in-sample period. This is divided by the total number of trades entered during the testing period to arrive at an average amount of days the model spends in one position, be it Long or Short. The results were implemented on each individual

instrument in the out-of-sample period and can be found in Appendix 8.6, rounded down to the nearest day, with the average between System 1 and the Integrated System attached to both systems.

4.4.3. Full System Optimization

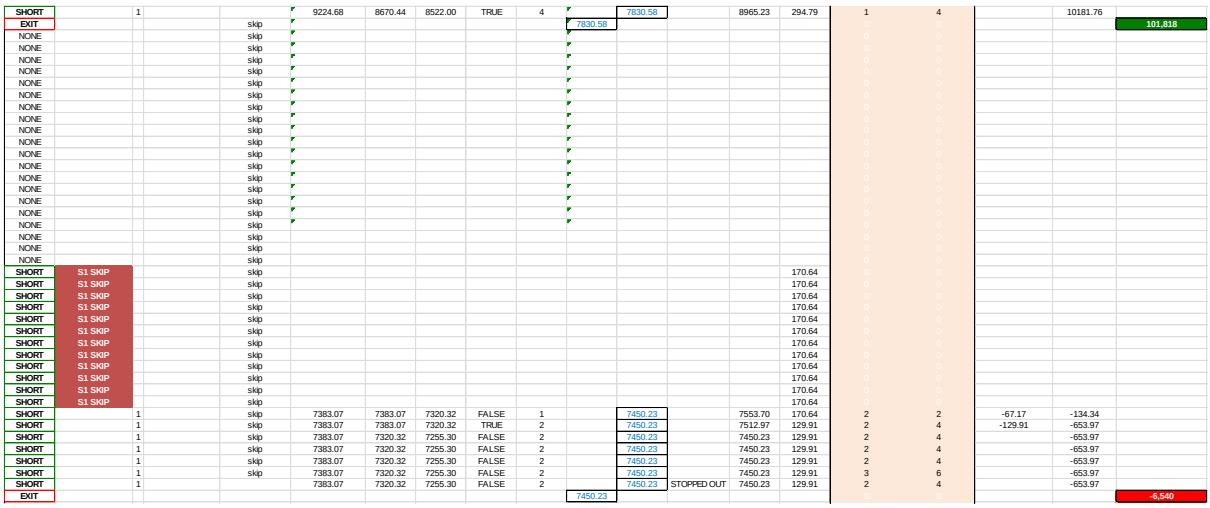
The original trading model was designed to use the S1 and S2 systems in conjunction with a failsafe entry-point filter being employed should a longer-term trend be identified using the S2 system. To recap, S1 would not enter into a trade should the prior trade have been a winning one, yet this was superseded by the S2 failsafe entry-point in the event a longer term trend was found. The justification behind doing this is sparse in the literature, and is thus necessary to stress-test to determine the suitability of this filter in a South African context. The following two switches were built into the model and backtested:

Failsafe Entry-point

The entry-point linked the S1 and S2 models together to better identify price trends and market movements, yet this was based on a system that was structured for a vastly different market era. Our model attempts to test this premise, by implementing a switch that removes the failsafe entry-point, thereby removing the link between S1 and S2. The model will still refrain from entering a trade should the previous trade have been a winner, however a failsafe filter rule from S2 will not over-ride any trading decision, essentially meaning the trade will be a 'pure' skip.

The methodology behind this is to firstly ascertain whether the full system has any merits in the South Africa markets, allowing us to determine the profitability of the system against S1 and S2 in isolation. Secondly, it allows us to determine the effectiveness of the 'skip trade' methodology. Assumedly this was done in an attempt to smooth the profitability of the trading model as large price trends entered into were theoretically not to be followed by another profitable upswing, but rather a smaller loss. (i.e. the model was assumed to function efficiently, in that it would identify the correct time to exit a large price trend)

Figure 10: Failsafe entry-point forms the backbone of the 'Integrated System' linking Systems 1 & 2



SHORT		1			9224.68	8670.44	8522.00	TRUE	4		7830.58		8965.23	294.79	1	4		10181.76	
EXIT				skip						7830.58									101,818
NONE				skip															
NONE				skip															
NONE				skip															
NONE				skip															
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NONE				skip															
NONE				skip															
NONE				skip															
NONE				skip															
SHORT	S1 SKIP			skip										170.64					
SHORT	S1 SKIP			skip										170.64					
SHORT	S1 SKIP			skip										170.64					
SHORT	S1 SKIP			skip										170.64					
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SHORT	S1 SKIP			skip										170.64					
SHORT	S1 SKIP			skip										170.64					
SHORT	S1 SKIP			skip										170.64					
SHORT	S1 SKIP			skip										170.64					
SHORT	S1 SKIP			skip										170.64					
SHORT		1		skip	7383.07	7383.07	7320.32	FALSE	1		7450.23		7553.70	170.64	2	2	-67.17	-134.34	
SHORT		1		skip	7383.07	7383.07	7320.32	TRUE	2		7450.23		7512.97	129.91	2	4	-129.91	-653.97	
SHORT		1		skip	7383.07	7320.32	7255.30	FALSE	2		7450.23		7450.23	129.91	2	4		-653.97	
SHORT		1		skip	7383.07	7320.32	7255.30	FALSE	2		7450.23		7450.23	129.91	2	4		-653.97	
SHORT		1		skip	7383.07	7320.32	7255.30	FALSE	2		7450.23		7450.23	129.91	2	4		-653.97	
SHORT		1		skip	7383.07	7320.32	7255.30	FALSE	2		7450.23		7450.23	129.91	3	6		-653.97	
SHORT		1			7383.07	7320.32	7255.30	FALSE	2		7450.23	STOPPED OUT	7450.23	129.91	2	4		-653.97	
EXIT										7450.23									-6,540

Figure 10 details the original failsafe entry-point system being implemented, with a prior trade being a winner (denoted by the green profit block). The filter dictates that the following trade to be entered should be skipped as the prior trade was a winning one. This is indeed the case, until the failsafe entry-point is triggered by the S2 system, which identified a longer-

term price trend in the instrument and reinitiated the trade, allowing the model to enter the trade (once entry and exit triggers were reached again).

Figure 11: Skip-trade signal triggered in System 1, preventing initial entry into a Short position

Date	High	Low	Close	20d HIGH	20d LOW	10d HIGH	10d LOW	TR	ATR	20d ATR	Position	Failsafe Break
06/11/09	7730.76	7590.20	7599.30	8187.34	**7590.20**	7938.20	**7590.20**	140.5611	124.19	170.64	SHORT	S1 SKIP
06/12/09	7643.08	7517.67	7531.08	8186.02	**7517.67**	7938.20	**7517.67**	125.4106	121.69	159.62	SHORT	S1 SKIP
06/15/09	7564.78	7501.87	7514.83	7998.55	**7501.87**	7938.20	**7501.87**	62.9097	122.61	144.05	SHORT	S1 SKIP
06/16/09	7586.71	7472.68	7547.61	7998.55	**7472.68**	7938.20	**7472.68**	114.0240	125.60	143.81	SHORT	S1 SKIP
06/17/09	7611.04	7473.90	7561.83	7998.55	7472.68	7896.66	7472.68	137.1402	128.88	144.67	SHORT	S1 SKIP
06/18/09	7655.27	7546.82	7619.51	7998.55	7472.68	7896.66	7472.68	108.4502	126.99	142.06	SHORT	S1 SKIP
06/19/09	7632.54	7552.86	7567.68	7990.85	7472.68	7798.32	7472.68	79.6767	127.64	138.64	SHORT	S1 SKIP
06/22/09	7613.28	7505.19	7580.27	7965.43	7472.68	7798.32	7472.68	108.0879	129.65	137.64	SHORT	S1 SKIP
06/23/09	7606.36	7523.21	7587.89	7938.20	7472.68	7786.64	7472.68	83.1485	133.38	136.66	SHORT	S1 SKIP
06/24/09	7592.46	7465.26	7503.90	7938.20	**7465.26**	7730.76	**7465.26**	127.2026	135.05	132.03	SHORT	S1 SKIP
06/25/09	7583.53	7501.72	7529.86	7938.20	7465.26	7655.27	7465.26	81.8150	136.50	126.97	SHORT	S1 SKIP
06/26/09	7571.79	7386.25	7406.38	7938.20	**7386.25**	7655.27	**7386.25**	185.5361	137.77	126.99	SHORT	S1 SKIP
06/29/09	7464.33	7301.80	7336.38	7938.20	**7301.80**	7655.27	**7301.80**	162.5303	134.67	125.48	SHORT	
06/30/09	7391.55	7146.52	7146.64	7938.20	**7146.52**	7655.27	**7146.52**	245.0245	130.97	129.91	SHORT	
07/01/09	7314.32	7148.76	7280.34	7896.66	7146.52	7655.27	7146.52	167.6807	123.33	130.05	SHORT	
07/02/09	7351.28	7261.56	7312.88	7896.66	7146.52	7632.54	7146.52	89.7217	121.51	128.88	SHORT	
07/03/09	7424.97	7292.60	7398.23	7798.32	7146.52	7613.28	7146.52	132.3735	122.46	124.11	SHORT	
07/06/09	7430.55	7338.32	7341.48	7798.32	7146.52	7606.36	7146.52	92.2305	125.48	123.62	SHORT	
07/07/09	7485.43	7337.42	7473.40	7786.64	7146.52	7592.46	7146.52	148.0142	124.71	126.05	SHORT	
07/08/09	7519.91	7427.56	7469.08	7730.76	7146.52	7583.53	7146.52	92.3447	127.83	124.19	EXIT	

Figure 12: Failsafe entry-point triggered as a result of System 2 generating an entry signal

Date	High	Low	Close	55d HIGH	55d LOW	20d HIGH	20d LOW	TR	ATR	20d ATR	Position	Trend Failsafe
06/11/09	7730.76	7590.20	7599.30	9079.80	7336.68	8187.34	**7590.20**	140.56	124.19	170.64	NONE	
06/12/09	7643.08	7517.67	7531.08	9079.80	7336.68	8186.02	**7517.67**	125.41	121.69	159.62	NONE	
06/15/09	7564.78	7501.87	7514.83	8919.56	7336.68	7998.55	**7501.87**	62.91	122.61	144.05	NONE	
06/16/09	7586.71	7472.68	7547.61	8860.33	7336.68	7998.55	**7472.68**	114.02	125.60	143.81	NONE	
06/17/09	7611.04	7473.90	7561.83	8709.82	7336.68	7998.55	7472.68	137.14	128.88	144.67	NONE	
06/18/09	7655.27	7546.82	7619.51	8315.99	7336.68	7998.55	7472.68	108.45	126.99	142.06	NONE	
06/19/09	7632.54	7552.86	7567.68	8281.72	7336.68	7990.85	7472.68	79.68	127.64	138.64	NONE	
06/22/09	7613.28	7505.19	7580.27	8281.72	7336.68	7965.43	7472.68	108.09	129.65	137.64	NONE	
06/23/09	7606.36	7523.21	7587.89	8281.72	7336.68	7938.20	7472.68	83.15	133.38	136.66	NONE	
06/24/09	7592.46	7465.26	7503.90	8281.72	7336.68	7938.20	**7465.26**	127.20	135.05	132.03	NONE	
06/25/09	7583.53	7501.72	7529.86	8281.72	7336.68	7938.20	7465.26	81.82	136.50	126.97	NONE	
06/26/09	7571.79	7386.25	7406.38	8281.72	7336.68	7938.20	**7386.25**	185.54	137.77	126.99	NONE	
06/29/09	7464.33	7301.80	7336.38	8281.72	**7301.80**	7938.20	**7301.80**	162.53	134.67	125.48	SHORT	
06/30/09	7391.55	7146.52	7146.64	8281.72	**7146.52**	7938.20	**7146.52**	245.02	130.97	129.91	SHORT	
07/01/09	7314.32	7148.76	7280.34	8188.17	7146.52	7896.66	7146.52	167.68	123.33	130.05	SHORT	
07/02/09	7351.28	7261.56	7312.88	8188.17	7146.52	7896.66	7146.52	89.72	121.51	128.88	SHORT	
07/03/09	7424.97	7292.60	7398.23	8188.17	7146.52	7798.32	7146.52	132.37	122.46	124.11	SHORT	
07/06/09	7430.55	7338.32	7341.48	8188.17	7146.52	7798.32	7146.52	92.23	125.48	123.62	SHORT	
07/07/09	7485.43	7337.42	7473.40	8187.34	7146.52	7786.64	7146.52	148.01	124.71	126.05	SHORT	
07/08/09	7519.91	7427.56	7469.08	8187.34	7146.52	7730.76	7146.52	92.34	127.83	124.19	EXIT	

Figure 11 and 12 look into this in more detail, with the S2 system initiating a short-entry trigger after the 55-day Low was reached by the instrument at 29/06/2009. This then initiated the failsafe entry-point which caused S1 above to re-enter the trade on the same date. Backtesting removes this link and tests the "pure skip" against System 1

Skip trade (Win-Loss)

A secondary test was conducted on the premise of skipping trades after a previous 'winning' trade. Therefore a switch was introduced to the model that implemented the condition that a position would not be taken had the previous trade been a 'losing' one. The logic here is that the trading model experiences significant amounts of losing trades, and consecutive losing trades, compared to winning trades. The objective would then be to smooth the earnings of the trading model for each instrument and attempt to lower the amount of losing trades while still capitalizing on price trends.

Figure 13: Optimization test to invert the failsafe entry-point methodology from 'winning' to 'losing' trades

Position	Failsafe Break		Trend Failsafe	Skip W Trade	Orig Entry	Last Entry	next entry	Pyramid?	#Pyramids	Exit	Exit	Stopped Out?	STOP	stop ATR	Contract Size	Account Risk	Pyramid Profit	Total Profit	profit
SHORT		1			4118.20	4118.20	4050.75	FALSE	1		4119.66		4253.10	134.90	1	1	-1.46	-1.46	
SHORT		1			4118.20	4118.20	4050.75	FALSE	1		4119.66		4253.10	134.90	1	1		-1.46	
SHORT		1			4118.20	4118.20	4050.75	TRUE	2		4119.66		4254.50	136.30	1	2	-68.91	-139.27	
SHORT		1			4118.20	4050.75	3981.85	TRUE	3		4119.66		4188.56	137.81	1	3	-137.81	-552.70	
SHORT		1			4118.20	3981.85	3910.82	FALSE	3		4119.66		4119.66	137.81	1	3		-552.70	
SHORT		1			4118.20	3981.85	3910.82	FALSE	3		4119.66		4119.66	137.81	1	3		-552.70	
SHORT		1			4118.20	3981.85	3910.82	FALSE	3		4119.66		4119.66	137.81	1	3		-552.70	
SHORT		1			4118.20	3981.85	3910.82	FALSE	3		4119.66		4119.66	137.81	1	3		-552.70	
SHORT		1			4118.20	3981.85	3910.82	FALSE	3		4119.66	STOPPED OUT	4119.66	137.81	1	3		-552.70	
EXIT				skip						4119.66									-5,527
NONE				skip															
NONE				skip															
NONE				skip															
NONE				skip															
NONE				skip															
LONG	S1 SKIP			skip										135.70					
LONG	S1 SKIP			skip										135.70					
LONG	S1 SKIP			skip										135.70					
LONG	S1 SKIP			skip										135.70					
LONG		1		skip	4534.15	4534.15	4602.42	FALSE	1		4603.58		4398.45	135.70	1	1	69.43	69.43	
LONG		1		skip	4534.15	4534.15	4602.42	FALSE	1		4603.58		4398.45	135.70	1	1		69.43	
LONG		1		skip	4534.15	4534.15	4602.42	FALSE	1		4603.58		4398.45	135.70	1	1		69.43	
LONG		1		skip	4534.15	4534.15	4602.42	FALSE	1		4603.58		4398.45	135.70	1	1		69.43	
LONG		1		skip	4534.15	4534.15	4602.42	TRUE	2		4603.58		4406.28	127.87	1	2	1.16	71.74	
LONG		1		skip	4534.15	4602.42	4666.09	TRUE	3		4603.58		4475.08	127.34	1	3	-62.51	-115.79	
LONG		1		skip	4534.15	4666.09	4728.60	TRUE	4		4603.58		4541.07	125.03	1	4	-125.03	-615.90	
LONG		1		skip	4534.15	4728.60	4795.00	FALSE	4		4603.58		4603.58	125.03	1	4		-615.90	
LONG		1			4534.15	4728.60	4795.00	FALSE	4		4603.58	STOPPED OUT	4603.58	125.03	1	4		-615.90	
EXIT				skip						4603.58									-6,159

Figure 13 details a similar trading outline as Figure 10 in the previous section, however the trade has been skipped after the prior trade was a 'losing' one (denoted by the red 'loss' block). In this instance, the failsafe entry-point was initiated as S2 identified a longer-term price trend and caused the previously-skipped trade to be re-entered.

5. Empirical Results

5.1. Initial results

Initially the trading model was implemented using the original constraints listed in Table 8 below across all sectors. All 3 systems were backtested across the initial tested period, allowing the out-of-sample period to be used for second stage of back-testing i.e. the optimality testing.

Sector	Entry days	Exit days	ATR stop-loss	ATR pyramid	Account risk	Max. pyramids per trade
Agriculture						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Currencies						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Energy						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Equity Indices						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4
Precious Metals						
S1	20-day	10-day	1.0	0.5	1.0%	4
S2	55-day	20-day	1.0	0.5	1.0%	4
Integrated	20-day	10-day	1.0	0.5	1.0%	4

Table 8: Trading strategy initial inputs used in backtesting over historic data

Discussed in more detail below, the models produced favourable results for the most part – significantly outperforming the buy-and-hold benchmark of the underlying instruments. The detailed results can be found in Appendix 8.7. However while the results are impressive at face value, some caveats to the methodology need to be addressed in order to better interpret the performance at a level more beneficial than simply outperformance on a cumulative annual growth level:

5.1.1 Caveats to the trading results

It is imperative to note that the cumulative returns should not be interpreted as absolute, but will be used to distinguish under- and over-performing instruments and sectors within the sample space. The first port of call for comparison purposes will be the performance metrics, Sharpe and Sortino Ratios, alongside the t-test statistics measured against the buy-and-hold benchmark. Inflated performance returns could be attributed to the following factors:

- **Trading costs** have not been incorporated into the model. As mentioned, the structure of the SAFEX is such that one can gain significant exposure in the futures market with comparatively minimal capital outlay. Therefore while trading costs are assumed to be immaterial to the final result, it is still a consideration worth noting.
- **Margin call requirements** have not been incorporated into the model. The objective of the research is primarily to determine if trend-following can be used to correctly identify trending price movements in the South African market space, taking priority over replicating a futures trading platform. This opens the door for more practical testing in this regard to incorporate margin requirements, specifically given that this methodology yields numerous negative trades which would undoubtedly require a margin call on one's portfolio. Therefore the returns should be treated as notional performance with this in mind, however it is still the ability to identify trends that is imperative. If successful, the ability to add contracts through pyramiding to that trend forms the core of this trading methodology, with the subsequent profits mitigating the historic drawdowns from margin calls initiated from capital depreciation.
- **Trading limits** have not been incorporated into the model. While the SAFEX generally does not impose any trading limits on futures contracts purchases or sales, physical limits could be encountered in terms of liquidity and demand/supply constraints. The model assumes that there is full liquidity for each instrument and that trades will be fully executed in a timeous manner, thereby assuming no slippage in trades. This does lead to extreme trading profits in some cases, (where one trade will yield a notional profit over ZAR1m for example). Although this is highly unlikely, the fundamental point is that the model is able to identify trends and exploit them to the maximum in these cases.
- **Full notional capital drawdowns (denoted with a *)** are noted for each instrument where they occur, however the models were allowed to continue in negative balances – in essence holding a trading account in a 'credit' balance. In most cases the system recouped the losses and produced positive abnormal returns in the end. This was done in order to identify the trend-following ability of each system within each sector and thereby better optimize the model, ergo this must be considered when interpreting the results that although the results may seem satisfactory at face value, it required a full capital drawdown to achieve the results.
- **Time period** of the initial testing period is an important consideration, as instruments that had a significantly longer testing period yielded stronger results in general. This is simply attributed to the aspect of having more capital to deploy in trades over time giving way to exponential capital growth.

With these caveats in mind, one can analyse the results across each sector.

5.1.2 Precious metals initial results

This sector performed fairly reasonably, seen in Table 2 below. Gold was the general leader, with all systems generating relatively large Sortino values (above 2 across all systems) with p-values below 0.3, indicating a strong difference in average

performance against the buy-and-hold benchmark, however not statistically significant. This echoed across Palladium (S1 and integrated system), Silver (S1) and Platinum (all systems). Platinum however displayed highly volatile return profiles, with S1 and the integrated system being fully drawn down. The volatility in the instrument can be seen by the relatively lower Sharpe ratios indicating inefficient risk-reward profiles.

Instrument	Start date	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability ($\alpha = 0.05$)
Copper							
S1	3/01/06	13.8%	38.0%	0.713	0.156	0.090	0.356
S2			62.1%	1.602	0.196		0.180
Integrated			33.9%	0.718	0.138		0.446
Gold							
S1	3/01/06	25.5%	89.8%	2.580	0.156	0.226	0.219
S2			88.9%	5.061	0.130		0.290
Integrated			87.4%	2.623	0.150		0.239
Palladium							
S1	3/01/06	21.9%	91.2%	2.723	0.156	0.148	0.234
S2*			70.0%	-0.101	-0.098		0.397
Integrated			79.6%	2.321	0.160		0.238
Platinum							
S1*	3/01/06	10.7%	132.0%	1.259	0.124	0.067	0.302
S2			115.1%	3.631	0.153		0.210
Integrated*			122.7%	16.464	0.120		0.316
Silver							
S1	3/01/06	26.1%	40.9%	0.626	0.165	0.178	0.509
S2			27.5%	0.272	0.136		0.693
Integrated			19.7%	-0.041	0.131		0.728

Table 9: Initial results - Precious metals sector

Despite satisfactory returns at face value, the Sharpe values were all below 0.2 indicating a relatively weak ability to yield satisfactory returns given the volatility of the systems. Copper and platinum largely outperformed the benchmark Sharpe ratio with some caveats: again platinum was fully drawn down in S1 and the integrated system, while the benchmark ratio was low as a result of underperforming returns in the commodities versus the sector average. Secondly, the t-test p-values not yielding any statistically significant results also allow one to conclude the inability to outperform the buy-and-hold benchmark with a 95% degree of confidence.

5.1.3 Energy initial results

Energy had relatively weak performance, with Gasoline (S1 & S2), Natural Gas (all) and WTIA (S2) have significant outperformance above the benchmark. Underperformance, as shown by the negative Sortino values, was found in Brent

Crude (integrated) and Heating Oil (S1 & integrated) meaning the instruments could not outperform the respective benchmarks given the level of downside risk taken on. WTIA had full capital drawdowns in the S1 and integrated systems yet was able to produce median results eventually.

Natural gas and gasoline (S1 & S2) both had Sortino values nearing 1 on the contrary, displaying ability to effective outperform the benchmark given the levels of downside risk. The comparatively higher Sharpe ratios of these instruments reinforced this notion of positive risk-adjusted return.

Instrument	Start date	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
Brent Crude							
S1	2/01/96	17.7%	19.7%	0.131	0.132	0.120	0.952
S2			18.0%	0.178	0.104		0.636
Integrated			10.6%	-0.115	0.060		0.344
Gasoline							
S1	3/01/06	11.8%	38.5%	0.843	0.202	0.083	0.361
S2			50.4%	1.221	0.200		0.275
Integrated			14.2%	0.094	0.100		0.823
Heating Oil							
S1	3/01/05	19.7%	7.2%	-0.125	0.034	0.139	0.506
S2			19.9%	0.400	0.105		0.555
Integrated			8.1%	-0.241	0.026		0.328
Natural Gas							
S1	3/01/05	-4.3%	41.7%	1.033	0.214	0.012	0.203
S2			34.7%	1.254	0.118		0.335
Integrated			36.6%	0.932	0.197		0.268
WTIA							
S1*	3/01/06	12.5%	21.3%	0.156	0.063	0.084	0.629
S2			38.7%	0.812	0.140		0.369
Integrated*			26.2%	1.489	0.114		0.350

Table 10: Initial results - Energy sector

Again, despite some positive results at face value, the Sharpe values were all below 0.2 (aside from the outperformers in natural gas and gasoline) indicating a relatively weak ability to yield satisfactory returns given the volatility of the systems. Again low average monthly returns in the underlying saw the benchmark Sharpe ratio being generally outperformed apart from the instance of heating oil. Secondly, the t-test p-values not yielding any statistically significant results also allow one to conclude once again the inability to outperform the buy-and-hold benchmark with a 95% degree of confidence.

5.1.4 Equity Indices initial results

The sector had underperforming results for the most part within Table 4 below, with a majority of instruments producing weak results for the longer-term S2 system. Full capital drawdowns were seen in GLDX (S2), RESI10 (S2) and Top40 (S2) while Capped Top40 and DiviPlus had negative Sortino values for this system. General underperformance in this system was also seen in the ABI, FIN15, FINDI30, SA Property and SWIX Top40 indices, with only the MidCap60, General Retailers and INDI25 displaying any notable long-term results (with Sortino values above 0.6 and relatively high Sharpe values in the 0.1-0.2 range). This inability to identify longer term trends within equity indices persisted throughout the research and could be a symptom of the long term mean reversion persistent on the JSE.

The star performer was the MidCap60 across all systems: Sortino values greater than 1.5 and Sharpe ratios in the 0.19-0.27 range indicate strong risk-adjusted returns given the level of volatility. A p-value of 0.030 for S1 allow one to deduce that the results were statistically significant from the underlying benchmark at the α=0.05 level, with S2 and the integrated system having significant results at a α=0.1 level.

The Top40 seemed to outperform with positive abnormal returns, however it generated weak Sortino and Sharpe values, highlighting the inability of the systems to extract satisfactory risk-adjusted value. The RESI10 produced stronger results on a returns basis, but again the relatively weak performance ratios (Sortino ratios below 0.7, Sharpe ratios below 0.18) did not justify the returns on risk-adjusted basis.

Instrument	Start date	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
African Banks							
S1	3/01/03	14.6%	20.9%	0.279	0.077	0.109	0.551
S2			10.9%	-0.059	-0.014		0.706
Integrated			9.2%	-0.119	0.041		0.558
ALSI							
S1	3/01/03	14.8%	45.5%	12.412	0.103	0.124	0.294
S2			17.0%	1.247	0.099		0.319
Integrated			33.1%	0.625	0.204		0.195
Capped Top40							
S1	2/01/04	15.1%	11.9%	0.085	0.074	0.132	0.853
S2			-3.9%	-0.018	0.022		0.890
Integrated			14.2%	0.115	0.088		0.786
DiviPlus							
S1	2/01/07	7.9%	2.4%	-0.351	-0.390	0.023	0.399
S2			1.0%	-0.346	-0.390		0.317
Integrated			0.8%	-0.480	-1.968		0.290
FIN15							

S1	3/01/03	11.1%	16.1%	0.277	0.096	0.070	0.490
S2			1.0%	0.077	0.041		0.823
Integrated			11.8%	0.115	0.069		0.818
FINDI30							
S1	3/01/03	16.2%	39.6%	1.163	0.147	0.151	0.148
S2			16.6%	12.725	0.102		0.297
Integrated			29.6%	0.547	0.157		0.293
Genre							
S1	3/01/03	23.1%	38.4%	1.368	0.174	0.195	0.149
S2			37.2%	0.672	0.166		0.204
Integrated			19.2%	-0.080	0.199		0.579
GLDX							
S1	3/01/03	0.6%	5.5%	0.264	0.026	-0.012	0.767
S2*			n.a.	-0.216	-0.216		0.050
Integrated			7.6%	0.361	0.026		0.808
INDI25							
S1	3/01/03	19.3%	44.1%	0.721	0.189	0.193	0.162
S2			24.8%	0.380	0.126		0.367
Integrated			25.8%	0.334	0.146		0.488
Mid-cap 60							
S1	3/01/03	18.5%	75.0%	2.530	0.259	0.193	0.030
S2			73.7%	2.176	0.196		0.088
Integrated			51.0%	1.512	0.263		0.058
RESI10							
S1	3/01/03	11.6%	40.7%	0.652	0.176	0.075	0.151
S2*			22.5%	0.697	0.118		0.245
Integrated			36.5%	0.600	0.161		0.185
SA Property							
S1	3/01/05	11.5%	14.3%	0.186	0.186	0.077	0.845
S2			11.4%	0.025	0.097		0.896
Integrated			4.5%	-0.426	-0.300		0.231
SWIX							
Top40							
S1	2/01/04	15.0%	11.2%	0.059	0.068	0.130	0.919
S2			13.6%	0.195	0.087		0.605
Integrated			5.0%	-0.190	-0.007		0.431
Top40							
S1	3/01/03	14.1%	21.6%	0.274	0.132	0.125	0.458
S2*			n.a.	0.174	0.065		0.554

Integrated		23.8%	0.311	0.152		0.401

Table 11: Initial results – Equity indices

Again, despite some positive results from the MidCap60 index, the Sharpe values were all below 0.2 with some negative values in the DiviPlus, GLDX and SWIX Top40, indicating a relatively weak ability to yield satisfactory returns given the volatility of the systems. The general theme across the sector was that high returns in the underlying benchmark ensured that the strategy could not outperform on a Sharpe ratio basis, while lower returns in the underlying saw that the strategy could not capitalise on a down-turning market and could also not beat the benchmark ratio. Secondly, the t-test p-values not yielding any statistically significant results (aside from the MidCap60) also allow one to conclude once again the inability to outperform the buy-and-hold benchmark with a 95% degree of confidence.

5.1.5 Currencies initial results

As seen in Table 5 below, the currencies sector yielded the weakest performance results in implementation of the original trading model. This can be attributed to the nature of the rate of appreciation or depreciation of currencies being significantly lower than that of other derivative instruments largely due to the sovereign and fiscal policies implemented in order to ensure stability in a country's currency. As such, the shorter- and longer-term trading systems used in the previous sectors could not identify trends as effectively, thereby yielding underperforming results.

While there were no fully drawn down accounts, underperformance was seen in the AUD, BWP, CHF, CNY, EUR (integrated), NZD (integrated), TKL, USD (S2 and integrated) and JPY (integrated) systems which produced either negative Sortino or Sharpe values; or both. Factoring in trading costs, liquidity concerns and margin requirements would further make these systems highly unattractive investments.

Highlights were in the GBP (S1 & S2) systems producing Sortino ratios above 0.5 (weak numbers but high in context of the sector), however the Sharpe values were just above 0 – indicating that even the star performers did not executed attractive risk adjusted returns. The JPY (S2) system was the only attractive model yielding a p-value of 0.050 with a Sortino value just above 1. However it must be noted that the aggregated benchmark was -5.2% which distorted the performance metrics to some degree, as the Sharpe ratio was 0.080 – showing again the weak risk-adjusted performance against the risk-free rate. This came as a result of the low average monthly returns in the benchmark Sharpe ratio (as discussed being the most appropriate comparable metric to use in our case) and the trading strategy not being able to generate sufficient returns in a relatively stable monthly ZAR exchange market.

Instrument	Start date	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
AUD/ZAR							
S1	1/01/97	5.5%	5.5%	0.103	-0.005	-0.028	0.879
S2		5.5%	3.3%	-0.037	-0.052		0.775
Integrated		5.5%	2.1%	-0.233	-0.286		0.283
BWP/ZAR							
S1	3/01/05	-2.9%	-2.3%	0.092	-4.409	-0.405	0.908

S2		-2.9%	-0.8%	0.388	-4.515		0.527
Integrated		-2.9%	-0.5%	0.522	-15.016		0.456
CAD/ZAR							
S1	20/01/99	5.5%	4.0%	0.026	-0.020	-0.024	0.957
S2		5.5%	4.0%	-0.024	-0.050		0.818
Integrated		5.5%	1.0%	-0.269	-0.345		0.213
CHF/ZAR							
S1	1/01/97	6.2%	6.1%	0.058	-0.004	0.000	0.995
S2		6.2%	6.6%	0.086	0.005		0.937
Integrated		6.2%	2.2%	-0.217	-0.253		0.268
CNY/ZAR							
S1	2/01/06	8.5%	1.8%	-0.332	-0.363	0.033	0.275
S2		8.5%	1.8%	-0.326	-0.325		0.337
Integrated		8.5%	0.5%	-0.415	-1.760		0.208
EUR/ZAR							
S1	4/01/99	3.3%	10.2%	0.384	0.052	-0.056	0.320
S2		3.3%	8.3%	0.346	0.034		0.523
Integrated		3.3%	3.3%	-0.001	-0.161		0.822
GBP/ZAR							
S1	1/01/97	3.1%	13.7%	0.605	0.099	-0.057	0.096
S2		3.1%	10.3%	0.527	0.050		0.373
Integrated		3.1%	5.5%	0.158	-0.073		0.777
NZD/ZAR							
S1	1/01/03	3.8%	8.6%	0.983	0.162	-0.049	0.090
S2		3.8%	2.9%	1.733	0.084		0.378
Integrated		3.8%	1.9%	-0.210	-0.437		0.569
TKL/ZAR							
S1	2/01/06	-1.5%	2.5%	0.277	-0.112	-0.205	0.530
S2		-1.5%	3.6%	0.304	-0.082		0.504
Integrated		-1.5%	0.1%	0.181	-0.785		0.845
USD/ZAR							
S1	1/01/96	5.1%	10.7%	0.320	0.066	-0.024	0.332
S2		5.1%	9.9%	0.288	0.048		0.507
Integrated		5.1%	4.5%	0.034	-0.141		0.679
ZAR/JPY							
S1	8/01/99	-5.2%	6.7%	0.498	0.031	-0.179	0.182
S2		-5.2%	14.0%	1.056	0.080		0.050
Integrated		-5.2%	2.7%	0.498	-0.117		0.267

Table 12: Initial results – Currency market

5.1.6 Agriculture initial results

The agricultural sector produced strong abnormal results, however some further caveats need to be added to this sector when analysing these results:

- **Soybeans, Sunflower seeds, Wheat, White Maize and Yellow Maize are the only instruments traded in ZAR terms** on the SAFEX, being produced and farmed in South Africa. The remainder (Coffee, Corn, Cotton and Sugar) are accessible to trade via the SAFEX as 'Quanto futures' (allowing access to internationally traded commodities on the CBOT or ICE exchanges), however the underlying instruments are denominated in USD (not being regularly produced or farmed in South Africa). This then means that the results are subject to USD/ZAR cross-currency effect which would inflate the returns by incorporating the depreciation of the ZAR against the USD into the underlying prices.
- This sector faces significant **liquidity constraints**, as the instruments are used primarily for hedging purposes. Speculative trades in the agricultural sector on the SAFEX do not have the same fervour as on international exchanges, and as such the contracts provide extreme amounts of leverage, being denominated for delivery in large quantities. This implies that price movements yield large notional capital changes in relation to the other derivative sectors. While it does not mean speculation in this sector is not possible, it must just be noted when analysing the performance

All trading systems produced satisfactory results that yielded strong performance metrics. The stand-out performers were Sunflower seeds (S1 & S2), Wheat (S1 & S2), White Maize (S1 & S2) and Yellow Maize (S1 & S2) that generated Sortino values above 1 with Sharpe ratios in the 0.15-0.25 range. These systems also produced statistically significant p-values highlighting the outperformance from the benchmark, and interestingly were the pure ZAR denominated contracts available to the South African investor. This can be attributed to the fact that the model saw previous successes in the literature in the agriculture sector and also contributes to the consistent outperformance of the benchmark Sharpe ratio. The fact that this is achieved on contracts only available to a South African investor is a vital area for further research.

Coffee and Cotton however experienced full capital drawdowns in Systems 2 and 2 & integrated system respectively, with coffee, cotton & corn having Sharpe ratios below 0.2, highlighting a relatively weak performance on a risk-adjusted basis.

Instrument	Start date	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
Coffee							
S1	3/01/05	17.8%	46.7%	0.724	0.178	0.125	0.174
S2*			32.0%	0.234	0.107		0.392
Integrated			43.0%	2.103	0.173		0.130
Corn							
S1	3/01/05	24.3%	66.3%	1.223	0.175	0.167	0.236
S2			38.8%	1.519	0.121		0.350
Integrated			53.7%	0.895	0.145		0.303

Cotton							
S1	3/01/05	16.8%	63.7%	1.001	0.194	0.118	0.142
S2*			51.3%	0.260	0.060		0.624
Integrated*			64.3%	11.484	0.113		0.308
Soybeans							
S1	2/01/96	8.2%	28.9%	12.031	0.179	0.050	0.015
S2			2.2%	0.443	0.079		0.322
Integrated			19.3%	0.535	0.119		0.373
Sugar							
S1	3/01/05	20.2%	57.8%	0.726	0.248	0.136	0.223
S2			58.2%	0.964	0.172		0.273
Integrated			51.7%	0.629	0.240		0.294
Sunflower							
S1	2/01/02	3.8%	63.0%	5.438	0.222	-0.02	0.016
S2			55.6%	0.807	0.172		0.066
Integrated			41.8%	2.157	0.217		0.041
Wheat							
S1	2/01/03	5.5%	50.7%	1.424	0.192	0.010	0.054
S2			53.5%	1.531	0.135		0.187
Integrated			33.2%	0.966	0.165		0.114
White Maize							
S1	4/01/00	10.3%	46.2%	0.993	0.220	0.070	0.086
S2			40.8%	0.890	0.156		0.157
Integrated			33.6%	0.779	0.184		0.254
Yellow Maize							
S1	4/01/00	9.4%	46.0%	1.235	0.209	0.060	0.068
S2			43.6%	1.557	0.133		0.188
Integrated			30.5%	0.761	0.194		0.213

Table 13: Initial results - Agricultural sector

5.2. Optimized out-of-sample trading strategy

Using the sensitivity analysis discussed in the methodology, the optimized inputs based on the historical performance of the instruments across the initial back-testing period can be seen in Table 1 below. The heat maps in appendices 8.2, 8.2, 8.4, 8.5 and 8.6 were used to determine the optimal points for each sector:

Sector	Entry days	Exit days	ATR stop-loss	ATR pyramid	Account risk	Max. pyramids per trade
Agriculture						
S1	20-day	5-day	2.5	0.05	3.0%	8
S2	45-day	3-day	2.5	0.05	3.0%	8
Integrated	20-day	5-day	2.5	0.05	3.0%	8
Currencies						
S1	20-day	3-day	2.5	0.05	3.0%	8
S2	60-day	5-day	2.5	0.05	3.0%	8
Integrated	20-day	3-day	2.5	0.05	3.0%	8
Energy						
S1	30-day	20-day	2.5	0.05	3.0%	8
S2	35-day	3-day	2.5	0.05	3.0%	8
Integrated	30-day	20-day	2.5	0.05	3.0%	8
Equity Indices						
S1	25-day	3-day	2.5	0.1	2.5%	8
S2	65-day	30-day	2.5	0.1	2.5%	8
Integrated	25-day	3-day	2.5	0.1	2.5%	8
Precious Metals						
S1	25-day	3-day	2.5	0.05	3.0%	7
S2	45-day	10-day	2.5	0.05	3.0%	7
Integrated	25-day	3-day	2.5	0.05	3.0%	7

Table 14: Optimized strategy inputs implemented in the out-of-sample testing period

It was found that shorter days in generating exit signals were appropriate across the board as it seems the model tended towards identifying shorter-term trends and maximizing the ability to add trades to those short term trends with a much lower ATR pyramid entry point, dictating that pyramiding trades are added every 0.05x the value of the ATR of that trading day. This meant that significantly more leverage would be placed into deemed trending trades than the original model resulting in large upswings in capital as a result of large one-off trades, but also higher instances of capital drawdowns. As mentioned, for comparability purposes, sector averages were applied across the separate systems as a broad test of applicability of the models. As the robustness of testing improves with further research, it should be a consideration to conduct rolling periodic tests on individual instruments to fully optimise the performance of the trading strategies.

The ATR stop-loss signal was pushed much higher, due to the effect of generating false exit signals leading to numerous losses on the account. However this was implemented as a risk mitigant by the original Turtle traders to try smooth

earnings out to appease their investor base. With no such restrictions in our research, the stop-loss has been maximized to 2.5x the days ATR to account for drastic spikes in volatility, but to allow some leniency in stop-orders.

The account risk and the number of pyramids allowed in one trade have also been maximized in this instance to investigate: 1) whether increased account risk implies more capital losses and 2) whether building on the success of pyramiding translates to stronger results.

5.2.1 Additional optimization

Trend identifier determinant

Each individual instrument was assigned the trend identifier caveat to add an additional pyramid (onto the maximum detailed in Table 1 above) after being in a trade position for a certain number of days. The number of days and calculations thereof can be found in Appendix 8.6, rounded down to the nearest day and the average between System 1 and the Integrated System attached to both systems.

Precious metals and Energy both had an average of 9 days for S1/Integrated System, and longer term (>30) periods for S2. Agriculture and Equity Indices followed the same logic with 8 days for S1 and longer term (>30) for S2. Currencies on the other hand sat in trades for much shorter time periods across all systems, largely due to the inability to correctly identify trends in the currency market.

Failsafe Entry-point – Pure skip vs. integrated system

Tests were found to lead to immaterial results as to whether linking the integrated system to the longer-term S2 system was more beneficial than simply implementing the logic based on a 'pure skip' basis (not linking the two systems). As such the results have not been detailed in the research.

Skip-trade – 'winning' trade vs. 'losing' trade

The results of altering the failsafe entry-point from a skip-trade based on a previous 'winning' trade to a previous 'losing' trade subsequently also proved immaterial as a result of the above and as such were also excluded from further research.

5.3. Out-of-sample results

The section below details the results achieved across the out-of-sample 3-year testing period from 2012 – 2014 across all sectors resulting from the optimized inputs in Table 14 above. The full detailed results can be found in Appendix 8.7.

5.3.1 Precious metals optimized results

The optimization of the trading models resulted in significantly improved performances against the previous metals sector in Systems S1 and the Integrated system seen in Table 15. The ability to enter trades and quickly add pyramids to the positions resulted in exponential capital growth that improved the Sortino and Sharpe ratio evolution over time (Appendix 8.8) in the out-of-sample period and outperformance against the benchmark Sharpe ratio. Both these systems across the entire metals sector yielded stronger Sortino values, indicating the ability of the systems to generate enough capital to mitigate downside risk more effectively than the original model. The Sharpe ratios also saw improvement by moving into the 0.3-0.45 range, however it needs to be considered whether this number is enough to compensate for the significant risks taken on by the trading models. This can be seen with a relatively low Sharpe ratio being produced amidst notional returns far above 100% p.a. Encouraging to note also that systems were able to outperform the benchmark Sharpe ratio

on an average monthly returns basis due to down turn in markets (with low or negative benchmark Sharpe ratios) indicating the improved ability of the optimized system to capitalize on declining markets, despite issues with significant volatility of returns.

This of course implied that the returns generated by S1 and the integrated system were statistically significant in yielding abnormal returns above the underlying benchmark in most cases, with all p-values below 0.015. Again this highlights the extreme volatility of the trading strategies compared to the benchmark buy-and-hold.

Instrument	Test Period	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
Copper							
S1	3/01/12	4.8%	168.4%	7.816	0.310	-0.039	0.068
S2	- 31/12/14		28.9%	0.677	0.144		0.386
Integrated			154.5%	8.210	0.404		0.024
Gold							
S1	3/01/12	2.7%	336.2%	11.068	0.495	-0.056	0.006
S2	- 31/12/14		216.7%	4.515	0.314		0.066
Integrated			308.5%	14.102	0.488		0.006
Palladium							
S1	3/01/12	20.5%	624.1%	10.452	0.449	0.169	0.014
S2*	- 31/12/14		283.0%	-0.069	-0.052		0.699
Integrated			600.2%	10.140	0.442		0.016
Platinum							
S1	3/01/12	7.3%	340.1%	14.254	0.448	0.022	0.011
S2*	- 31/12/14		265.0%	-0.149	-0.149		0.384
Integrated			328.9%	18.597	0.450		0.011
Silver							
S1	3/01/12	-6.7%	412.0%	26.153	0.344	-0.100	0.034
S2	- 31/12/14		336.1%	5.588	0.232		0.169
Integrated			370.5%	25.271	0.333		0.041

Table 15: Out-of-sample results – Precious metals sector

System 2 unfortunately did not fare well, with Platinum and Palladium again being fully drawn down over the period. The performance ratios across the sector for the system were significantly lower and can be seen to deteriorate in Appendix 8.8 over time. This could be attributed to the current commodity cycle that took effect during the out-of-sample period and which was not perhaps accounted for historically in the initial testing period.

5.3.2 Energy optimized results

Table 16 below indicates that the energy sector showed strong improvement in contrast to the results of the initial testing stage, with the WTIA S1 and integrated system delivering strong metrics and no fully drawn down accounts. However Brent Crude integrated system was fully drawn down over this test period.

While the results showed a marked improvement on the previous results, in comparison to the other sectors energy delivered median results. Strengthening in Sortino and p-values were seen across the board with Brent Crude (S1 & S2), Gasoline (S2) and Heating Oil (S2) generating significant abnormal returns. However Sharpe ratios remained in a relatively low range of 0.2-0.3 mostly, therefore eliciting the question again whether the returns achieved are attractive from a risk-reward perspective. Again negative benchmark returns equated to lower or negative benchmark Sharpe ratios while the optimised systems were able to better capitalise on downward price trends and hence far outperform the benchmark metrics. Appendix 8.8. highlights that this was done on a consistent basis during the out-of-sample period.

Instrument	Test period	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
Brent Crude							
S1	3/01/12	-9.8%	225.2%	1.815	0.309	-0.192	0.060
S2	- 31/12/14		230.2%	6.124	0.418		0.013
Integrated*			n.a.	-0.186	-0.193		0.271
Gasoline							
S1	3/01/12	-9.1%	109.3%	1.592	0.265	-0.124	0.098
S2	- 31/12/14		129.3%	2.592	0.393		0.026
Integrated			58.3%	0.876	0.211		0.176
Heating Oil							
S1	3/01/12	-4.4%	111.8%	1.726	0.262	-0.135	0.103
S2	- 31/12/14		131.8%	7.345	0.480		0.006
Integrated			101.8%	1.353	0.235		0.143
Natural Gas							
S1	3/01/12	11.6%	48.4%	1.068	0.223	0.083	0.212
S2	- 31/12/14		214.7%	7.208	0.285		0.109
Integrated			86.8%	0.944	0.241		0.205
WTIA							
S1	3/01/12	-9.4%	163.8%	1.762	0.267	-0.164	0.106
S2	- 31/12/14		21.5%	0.788	0.212		0.180
Integrated			210.6%	4.727	0.237		0.142

Table 16: Out-of-sample results – Energy sector

5.3.3 Equity indices optimized results

As with the results obtained by the precious metals sector, the optimization resulted in significantly improved performances in the prior results in Systems S1 and the integrated system, seen in Table 17 below. Both systems across the entire sector yielded stronger Sortino values, indicating the ability of the systems to generate enough capital to mitigate downside risk more effectively than the original model. The Sharpe ratios also saw improvement by moving into the 0.3-0.45 range, with previous 'losers' (DiviPlus, General Retailers, SA Property, SWIX Top 40) now generating improved positive results. Generally the strategies consistently outperformed the benchmark Sharpe ratio and over the course of the out-of-sample period (Appendix 8.8), apart from markets that generated high returns (INDI25 and FINDI30). This demonstrates the contrarian nature of the strategy in line with the theory discussed as the model tends to outperform in periods of poor performing benchmark markets.

Significant p-values at a 95% confidence level were achieved by ABI, ALSI, Capped Top40, EW Top40, FINDI30, General Retailers and Midcap 60 again (S1/integrated) with 90% significance achieved by INDI25 (s1), RESI10 (integrated), SWIX Top 40 (S1/integrated), Top 40 (S1/integrated) and FIN15 (S1). This is a troubling trend which highlights the outperformance in returns of the strategies, but also the vast differences in volatility of returns in the sector against the benchmarks.

Interesting to note is the introduction of the EW Top40 index which was not included in the initial rounds of testing due to only having 4-years of historic price data available. It followed the sectorial trend of strong performance in the S1 and integrated systems, with a full drawdown in S2. Again as we saw in precious metals, S2 did not perform well across the board, with fully drawn down notional accounts in ABI, ALSI, Capped Top40, FINDI30, GLDX, INDI25, RESI10, SWIX Top40 and the Top40. Again this could be attributed to the blanket treatment of the stop-loss ATR amount in allowing the systems to run without stringent stop-losses in place in a deadly combination of higher exit signal days.

Instrument	Test period	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
African Banks							
S1	3/01/12	20.4%	227.8%	5.769	0.507	0.229	0.011
S2*	- 31/12/14		118.4%	0.958	0.226		0.214
Integrated			211.4%	5.610	0.429		0.024
ALSI							
S1	3/01/12	15.0%	401.3%	8.871	0.366	0.199	0.041
S2*	- 31/12/14		258.7%	0.568	0.130		0.453
Integrated			379.7%	8.682	0.358		0.045
Capped Top40							
S1	3/01/12	15.1%	277.1%	8.544	0.482	0.187	0.008
S2*	- 31/12/14		262.3%	0.450	0.139		0.422

Integrated			270.8%	7.329	0.463		0.011
DiviPlus							
S1	3/01/12	8.6%	20.5%	1.151	0.223	0.030	0.334
S2	- 31/12/14		-1.1%	-0.182	-0.081		0.636
Integrated			18.6%	1.002	0.200		0.400
EW Top40							
S1	3/01/11	10.3%	208.3%	5.860	0.444	0.074	0.004
S2*	- 31/12/14		190.1%	0.304	0.107		0.473
Integrated			203.0%	6.325	0.406		0.008
FIN15							
S1	3/01/12	22.5%	284.2%	11.027	0.304	0.328	0.098
S2	- 31/12/14		130.4%	1.961	0.220		0.219
Integrated			271.4%	9.798	0.268		0.142
FINDI30							
S1	3/01/12	27.1%	544.0%	9.254	0.429	0.471	0.021
S2*	- 31/12/14		n.a.	0.451	0.095		0.586
Integrated			523.5%	8.602	0.420		0.024
Genre							
S1	3/01/12	13.9%	227.8%	8.394	0.582	0.112	0.002
S2	- 31/12/14		111.5%	1.660	0.229		0.192
Integrated			195.5%	6.022	0.518		0.004
GLDX							
S1	3/01/12	-26.7%	207.0%	54.863	0.208	-0.240	0.185
S2*	- 31/12/14		49.6%	16.684	0.166		0.329
Integrated			164.7%	31.512	0.381		0.012
INDI25							
S1	3/01/12	28.7%	540.7%	7.933	0.335	0.492	0.067
S2*	- 31/12/14		264.3%	31.061	0.169		0.326
Integrated			517.0%	12.259	0.304		0.100
Mid-cap 60							
S1	3/01/12	16.4%	566.5%	25.268	0.382	0.270	0.034
S2*	- 31/12/14		9.4%	1.491	0.254		0.146
Integrated			515.8%	25.502	0.375		0.037
RESI10							
S1	3/01/12	-7.7%	529.8%	14.603	0.276	-0.197	0.105
S2*	- 31/12/14		n.a.	-0.211	-0.219		0.209
Integrated			526.0%	13.888	0.297		0.082
SA Property							
S1	3/01/12	14.9%	56.3%	3.061	0.349	0.144	0.111

S2	- 31/12/14		31.8%	0.627	0.148		0.534
Integrated			54.8%	2.908	0.343		0.121
SWIX Top40							
S1	3/01/12	16.9%	186.2%	1.358	0.337	0.240	0.066
S2*	- 31/12/14		154.0%	1.602	0.165		0.343
Integrated			183.3%	1.333	0.328		0.072
Top40							
S1	3/01/12	14.6%	400.4%	4.674	0.326	0.170	0.067
S2*	- 31/12/14		335.4%	2.176	0.245		0.144
Integrated			401.4%	4.663	0.319		0.072

Table 17: Out-of-sample results – Equity indices

5.3.4 Currencies optimized results

The currencies sector saw the most improvement on the back of weak initial results. This is largely due to the optimized model being able to identify shorter term trends in line with the nature of this sector, and being able to effectively leverage those trends into profitable results. The comparatively lower rolling volatility seen in Appendix 8.8 in the BWP however, resulted in inability to identify trends effectively and therefore underperformance.

The sector also produced more favourable comparative Sharpe ratios in the range 0.4-0.5 largely in Table 18 below. This improvement on a risk-reward basis in relation to the other sectors is due to the lower volatility within the sector (Appendix 8.8) but also pleasing given the liquidity in the currency market. This would allow traders to better replicate this model by not being subject to liquidity bottlenecks or volatility swings. It is clear that optimisation of the strategies far improved the performance in the sector as the model was able to extract returns from a low-volatility market as best as possible highlighted by outperformance against the benchmark Sharpe ratios, highlighted in the evolution of the metrics over time quite poignantly (Appendix 8.8). This sector was most attractive from a 'stable' returns basis, as p-values were larger than other sectors and Sharpe and Sortino ratios were relatively large. This implied that the systems were able to extract returns out of comparatively lower volatile markets, displayed in the rolling-volatility measures in Appendix 8.8.

Instrument	**Test Period**	**Benchmark return**	**Strategy CAGR**	**Sortino Ratio**	**Sharpe Ratio**	**Benchmark Sharpe Ratio**	**Monthly returns t-test probability (α = 0.05)**
AUD/ZAR							
S1	3/01/12	4.6%	46.2%	4.291	0.383	-0.083	0.013
S2	- 31/12/14		40.5%	5.231	0.402		0.017
Integrated			31.5%	2.505	0.471		0.015
BWP/ZAR							
S1	3/01/12	4.0%	2.1%	-0.355	-0.773	-0.202	0.515
S2	- 31/12/14		1.7%	-0.371	-0.592		0.529
Integrated			1.9%	-0.427	-0.968		0.460
CAD/ZAR							

S1	3/01/12	5.5%	51.4%	5.811	0.427	0.012	0.033
S2	- 31/12/14		22.1%	1.309	0.172		0.382
Integrated			41.1%	4.692	0.433		0.038
CHF/ZAR							
S1	3/01/12	10.7%	58.5%	3.242	0.432	0.084	0.032
S2	- 31/12/14		58.6%	2.501	0.250		0.174
Integrated			54.3%	3.124	0.442		0.030
CNY/ZAR							
S1	3/01/11	13.3%	26.9%	1.149	0.483	0.123	0.198
S2	- 31/12/14		13.1%	0.015	0.148		0.948
Integrated			17.9%	0.341	0.314		0.683
EUR/ZAR							
S1	3/01/12	10.3%	78.4%	4.381	0.456	0.069	0.017
S2	- 31/12/14		74.7%	3.171	0.288		0.124
Integrated			73.0%	4.111	0.472		0.013
GBP/ZAR							
S1	3/01/12	12.9%	101.9%	5.251	0.511	0.133	0.008
S2	- 31/12/14		90.7%	5.104	0.303		0.109
Integrated			83.0%	4.237	0.424		0.029
NZD/ZAR							
S1	3/01/12	12.8%	59.1%	3.640	0.439	0.153	0.015
S2	- 31/12/14		39.2%	1.641	0.290		0.163
Integrated			51.3%	3.052	0.434		0.018
TKL/ZAR							
S1	3/01/12	5.2%	32.9%	4.128	0.393	-0.075	0.009
S2	- 31/12/14		20.7%	1.355	0.227		0.164
Integrated			24.2%	2.600	0.307		0.053
USD/ZAR							
S1	3/01/12	12.8%	85.1%	5.950	0.587	0.113	0.004
S2	- 31/12/14		56.9%	2.765	0.290		0.176
Integrated			72.1%	4.228	0.533		0.010
ZAR/JPY							
S1	3/01/12	2.8%	102.0%	20.300	0.390	-0.05	0.025
S2	- 31/12/14		79.5%	15.771	0.302		0.062
Integrated			91.4%	20.250	0.424		0.016

Table 18: Out-of-sample results – Currency market

5.3.5 Agriculture optimized results

Given the caveats discussed in the prior results, the agriculture sector produced strong results with only S1 Corn having a fully drawn down account. While the Sortino values were significantly higher than previous results and against other optimized sector results, indicating the ability of the systems to generate enough capital to mitigate downside risk more effectively than the original model, the Sharpe ratios were subject to the risk-reward debate more so than any other sector. Trading in the 0.2-0.4 range, the significantly higher notional system CAGRs were unable to generate ratios higher than this range seen in other sectors. This highlights the ineffective performance to provide attractive risk-adjusted returns, especially on the back of liquidity constraints in the sector. The majority of systems improved significantly against the benchmark Sharpe ratio and Appendix 8.8 shows that this was done on a stable basis.

In terms of the t-test results, the sector did not provide a majority statistically significant p-values across the sector, with only Coffee (S2) and Soybeans (S2) achieving p-values below 0.05 highlighting the volatility swings exacerbated by the USD/ZAR exchange rate associated with these instruments. It can be inferred then that while the sector had marked improvements in returns and Sortino ratios, this was not enough to justify the less-than-relative improvement in the Sharpe ratios combined with the inability to state the returns differed from the benchmark at a significant level by-and-large. The results can be seen in Table 19 below:

Instrument	Test period	Benchmark return	Strategy CAGR	Sortino Ratio	Sharpe Ratio	Benchmark Sharpe Ratio	Monthly returns t-test probability (α = 0.05)
Coffee							
S1	3/01/12	1.8%	911.6%	17.560	0.296	-0.009	0.093
S2	- 31/12/14		771.8%	7.979	0.379		0.030
Integrated			789.2%	11.720	0.440		0.017
Corn							
S1*	3/01/12	-4.6%	559.0%	1.033	0.145	-0.064	0.393
S2	- 31/12/14		417.0%	13.684	0.268		0.112
Integrated			550.4%	9.579	0.188		0.273
Cotton							
S1	3/01/12	-3.3%	720.9%	6.672	0.224	-0.081	0.192
S2	- 31/12/14		535.9%	4.815	0.373		0.028
Integrated			385.1%	9.118	0.312		0.072
Soybeans							
S1	3/01/12	6.4%	510.2%	6.970	0.310	0.021	0.071
S2	- 31/12/14		389.8%	7.654	0.412		0.023
Integrated			308.6%	3.994	0.266		0.123
Sugar							
S1	3/01/11	-5.2%	407.8%	39.894	0.171	-0.224	0.318
S2	- 31/12/14		205.6%	4.674	0.225		0.173
Integrated			355.5%	6.114	0.208		0.217
Sunflower							

S1	3/01/12	4.6%	520.9%	30.298	0.370	-0.009	0.031
S2	- 31/12/14		358.3%	20.148	0.310		0.066
Integrated			464.5%	17.391	0.228		0.180
Wheat							
S1	3/01/12	12.6%	347.9%	6.126	0.237	0.095	0.171
S2	- 31/12/14		304.4%	21.401	0.207		0.228
Integrated			275.2%	3.673	0.194		0.248
White Maize							
S1	3/01/12	-6.8%	622.5%	14.961	0.225	-0.078	0.180
S2	- 31/12/14		493.1%	9.385	0.212		0.203
Integrated			489.2%	13.136	0.234		0.162
Yellow Maize							
S1	3/01/12	-5.9%	573.7%	26.328	0.209	-0.070	0.210
S2	- 31/12/14		469.4%	29.883	0.237		0.147
Integrated			486.7%	19.422	0.226		0.172

Table 19: Out-of-sample results – Agricultural sector

6. Conclusion

This research report garnered some interesting results with broad inferences that were both encouraging and disappointing. Encouraging in the sense that the research was able to employ a trend-following trading strategy based off Donchian Channels and optimise it for use on the South African market, producing exceptional notional returns in most cases and outperformance over benchmark metrics in the out-of-sample testing period. Yet disappointing in the sense that these results were achieved at the sacrifice of stability of returns, with the trading strategy exhibiting immense swings in volatility and acceptance of risk to achieve what can be thought of as unjustifiable reward given these tenets.

The caveats to the trading results must be reiterated again as performance results had to convincingly outperform in order to be considered successful given these caveats, particularly given the levels of risk one needed to take on. Trading costs were largely negligible in the South African context but cannot be discounted completely if robustness in the model is truly sought. Margin call requirements would have significantly hampered the pure trading results as a result of numerous drawdowns in capital accounts in the search for price trends. Trading limits, largely physical limits as a result of liquidity constraints, would have hampered the later stages of larger accounts. Ideally a working trading model with these constraints built in would provide robustness to the testing methodology and should be the objective of future research; what is fundamental is the ability of a simple trading strategy to implemented and improved upon with the hope of channelling academic efforts in the right direction and spurring further study in the field

As posited, the initial implementation of the original trading model on the in-sample testing period yielded underwhelming results against the performance metrics. Across all sectors, most instruments struggled to convincingly surpass the benchmark Sharpe ratio on a monthly average returns basis and produced Sortino ratios that were not strong enough to justify returns above the downside deviation present in the strategies. In terms of the evolution of these metrics, the outperformance, when present, was not stable over the years and could not present a case for adoption on an institutional or commercial level of trading. The profile of returns and capital accounts in Appendix 8.7 poignantly showed the issue with the trading strategy that was a recurring theme in the research that while trends were able to be identified, these profitable events were largely followed by significant and numerous instances of capital drawdowns that exacerbated the volatility of returns. This historically was the main detraction from the original Turtle method and why it was not adopted on an institutional level – while a trend-line of returns could theoretically be drawn from the model, this was generated from a return profile that was more akin to that of a rollercoaster. It must then be clarified that volatility in the strategies arose not due to numerous instances of negative returns, but rather events of very large profitable trades accompanied with numerous smaller capital drawdowns.

The out-of-sample tests produced far more encouraging results despite the recurring theme of significant volatility present. Largely all sectors were able to generate large notional returns and therefore able to outperform the benchmark metrics by some degree. Sortino ratios were also significantly higher but most encouraging was that this was mostly achieved on a consistent and stable basis when looking at the evolution of these metrics over the period. One aspect that must be considered is that this was partly achieved by increasing the level of pyramiding of additional trades allowable and increasing the account risk per trade threefold. The weakness of the research in this regard is that the caveat of margin call requirements would have had a far more dramatic impact on the results had it been incorporated into the model. The

debate then arose as to whether these notional returns were justified given the presence of significant risk needed to achieve these returns. While this is perhaps not the case for the most part, the key takeaway is what can be improved upon (discussed in 6.1 below) and where to channel future research. The results showed that the equity indices and currencies sector were perhaps the most justifiable set of results given the highest Sharpe ratio values indicating greatest reward for the risk taken on by the investor in conjunction with higher Sortino ratios than other sectors. This is perhaps in part due to the fact that the underlying instruments were not subject to the additional volatility introduced from the USD/ZAR exchange rate as is the case in commodities, energy and the majority of agriculture. With this in mind, strong performance was also noted by ZAR denominated agricultural contracts being sunflower seeds, wheat, white maize and yellow maize.

6.1. Recommendations for future research

With the fundamental issue of volatility of returns being identified as the strategy's major weakness and the performance of the instruments that showed most promise identified, one can now best channel the areas for future research.

i. Construction and implementation of the trading strategy

As previously discussed, all mentioned caveats in Section 5.1.1 introduced weakness to the robustness of the testing methodology of the model and as such should be addressed in future research. Particular attention should be given to margin call requirements which would be enacted by brokers automatically should capital levels reach below a sufficient level. Incorporating this into the model would significantly improve risk mitigation as price movements in the underlying instrument accelerate the depletion of capital the more leverage is taken on. (Brokers allow a range of leverage options while our research simply used the contract specifications of maximum leverage allowable per instrument on the SAFEX) Instruments could be significantly de-levered to achieve satisfactory levels of volatility or perhaps adjusted on a rolling basis should price trends be identified in a similar fashion to the trend determinant methodology found in Appendix 8.6. Generally this would aid in improving the robustness of results and as such deeper testing could be done on individual instruments to further improve performance or adjust for idiosyncratic factors that impact volatility of returns.

ii. Risk mitigation

As mentioned the most pressing issue to the research was the issue of volatility of returns and in turn the reward levels of the strategy given the risk taken on. Further research should be concentrated in this field given that this paper largely focussed on the maximisation of returns in order to test the feasibility of future research in the field. Building on Vince (1990) and Anderson & Faff's (2004) work around implementing the *optimal f* technique to determine ideal capital allocation should be addressed, in combination with the tenets mentioned in point (i) above. A simpler improvement to our research would be to construct the stop-loss optimisation with a priority of risk mitigation or preventing capital drawdowns. A weakness in the testing was found that the stop-loss values were stress tested against performance returns as opposed to drawdown instances, meaning that the stress tests attempted to rid the model of stop-loss orders to bolster returns. Lastly, the notion of constructing a portfolio of contracts to trade can be undertaken with the correlation matrices in Appendix 8.1 used to construct an optimal portfolio where sufficient negatively correlated markets are present in the portfolio to achieve the desired level of hedging. The robustness of the matrices could also be improved by conducting rolling correlation tests to better account for recent market movements, as opposed to historical values.

iii. Backtesting of the trading strategies

Previously mentioned, a major concern in the research was the occurrence of the data snooping bias that arises when backtesting a strategy over historical data and proposing its effectiveness in some future period. The out-of-sample testing attempted to mitigate this effect but the robustness of the performance results could be vastly improved using the stationary bootstrapping techniques proposed by Brock et al. (1992) which form the basis of White's (2000) expansion using the White's Reality Check for data snooping.

7. References

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8. Appendices

8.1. Sector correlation matrices

Agriculture

	COTTON	SOYBEAN	WHEAT	SUNFLOWER	CORN	WHITE MAIZE	YELLOWMAIZE	COFFEE	SUGAR
COTTON	1.000								
SOYBEAN	0.002	1.000							
WHEAT	-0.043	0.017	1.000						
SUNFLOWER	-0.023	0.036	0.022	1.000					
CORN	0.011	0.616	0.044	0.042	1.000				
WHITE MAIZE	-0.001	0.016	0.329	0.069	0.050	1.000			
YELLOWMAIZE	-0.019	0.020	0.329	0.053	0.053	0.874	1.000		
COFFEE	0.009	-0.011	0.061	-0.008	0.029	0.023	0.040	1.000	
SUGAR	-0.038	0.000	0.055	0.006	0.008	0.036	0.041	0.291	1.000

Currencies

	ZARJPY	AUDZAR	BWPZAR	CADZAR	CHFZAR	CNYZAR	EURZAR	NZDZAR	POUNDZAR	TKLZAR	USDZAR
ZARJPY	1.000										
AUDZAR	-0.512	1.000									
BWPZAR	-0.053	0.058	1.000								
CADZAR	-0.703	0.750	0.091	1.000							
CHFZAR	-0.837	0.612	0.064	0.743	1.000						
CNYZAR	-0.058	0.079	0.762	0.089	0.066	1.000					
EURZAR	-0.085	0.095	0.680	0.099	0.109	0.826	1.000				
NZDZAR	-0.550	0.852	0.079	0.737	0.633	0.075	0.106	1.000			
POUNDZAR	-0.094	0.100	0.693	0.107	0.117	0.842	0.869	0.112	1.000		
TKLZAR	0.006	0.042	0.476	0.021	0.008	0.596	0.559	0.042	0.564	1.000	
USDZAR	-0.069	0.077	0.759	0.092	0.076	0.983	0.837	0.072	0.857	0.595	1.000

Equity Indices

	FINDI30	SWIXTOP40	CAPPEDTOP40	SAPROP	MIDCAP60	INDI25	RESI10	GLDX	GERE	ABI	ALSI	FIN15	TOP40
FINDI30	1.000												
SWIXTOP40	-0.018	1.000											
CAPPEDTOP40	-0.018	0.989	1.000										
SAPROP	0.426	0.131	0.120	1.000									
MIDCAP60	0.768	0.171	0.165	0.587	1.000								
INDI25	0.970	-0.004	-0.003	0.401	0.758	1.000							
RESI10	0.641	0.007	0.013	0.269	0.600	0.639	1.000						
GLDX	0.209	0.003	0.004	0.087	0.274	0.241	0.541	1.000					
GERE	0.660	0.082	0.070	0.442	0.789	0.655	0.409	0.155	1.000				
ABI	0.825	-0.034	-0.037	0.389	0.673	0.696	0.474	0.110	0.602	1.000			
ALSI	0.880	0.013	0.015	0.398	0.773	0.866	0.921	0.428	0.597	0.694	1.000		
FIN15	0.912	-0.014	-0.016	0.449	0.746	0.793	0.565	0.135	0.636	0.941	0.793	1.000	
TOP40	0.872	-0.003	0.001	0.371	0.735	0.858	0.929	0.431	0.569	0.682	0.998	0.781	1.000

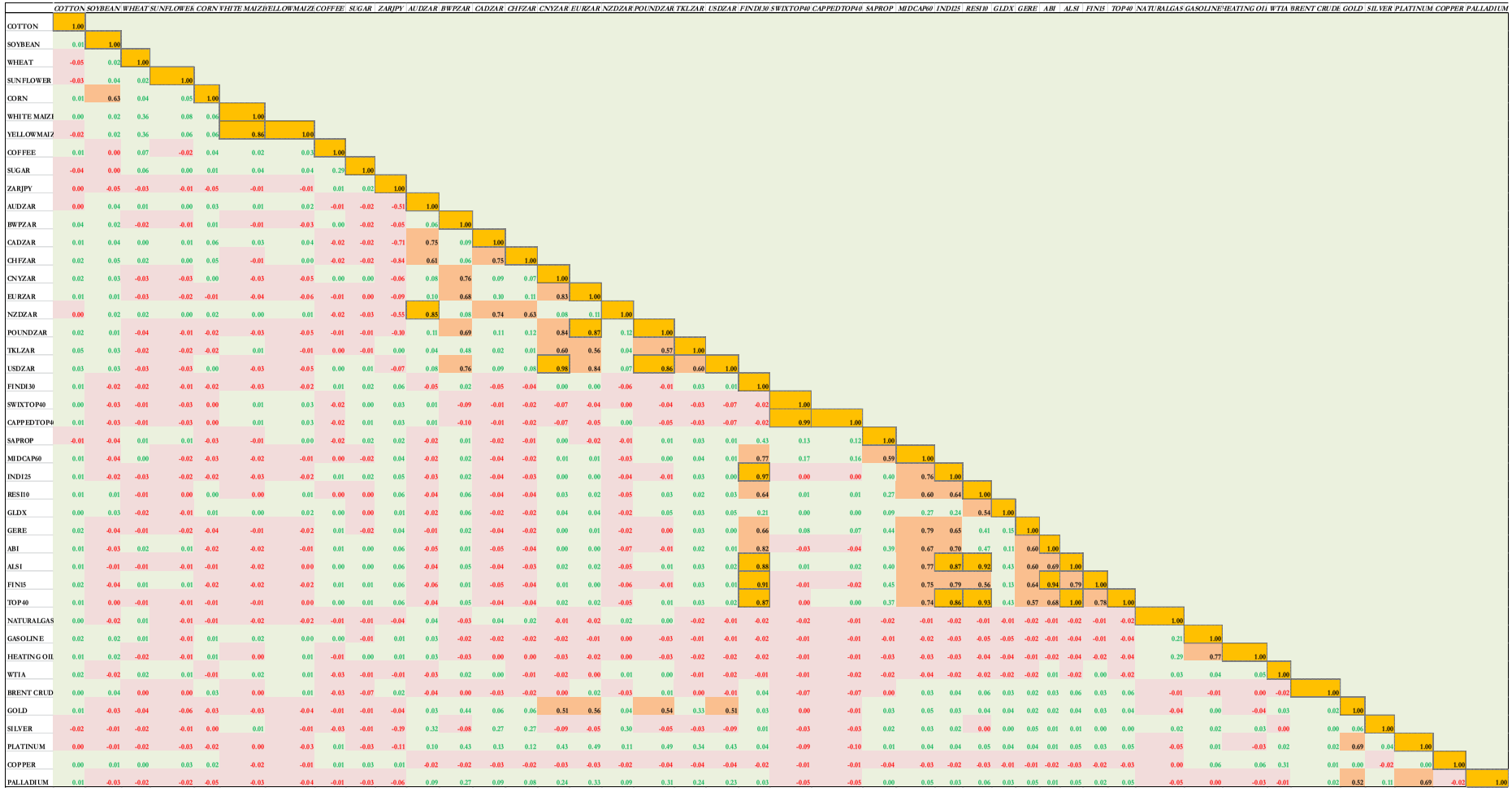
Energy

	NATURALGAS	*GASOLINE*	*HEATING OIL*	*WTIA*	*BRENT CRUDE*
NATURALGAS	1.000				
GASOLINE	0.210	1.000			
HEATING OIL	0.289	0.767	1.000		
WTIA	0.026	0.034	0.043	1.000	
BRENT CRUDI	-0.003	-0.004	-0.001	-0.021	1.000

Precious Metals

	GOLD	*SILVER*	*PLATINUM*	*COPPER*	*PALLADIUM*
GOLD	1.000				
SILVER	0.060	1.000			
PLATINUM	0.690	0.042	1.000		
COPPER	0.000	-0.016	0.001	1.000	
PALLADIUM	0.521	0.114	0.689	-0.017	1.000

Full dataset correlation matrix



	COTTON	SOYBEAN	WHEAT	SUNFLOWER	CORN	WHITE MAIZE	YELLOW MAIZE	COFFEE	SUGAR	ZARJPY	AUDZAR	BWPZAR	CADZAR	CHFZAR	CNYZAR	EURZAR	NZDZAR	POUNDZAR	TKLZAR	USDZAR	FINDI30	SWIXTOP40	CAPPEDTOP40	SAPROP	MIDCAP60	INDI25	RESI10	GLDX	GERE	ABI	ALSI	FINI5	TOP40	NATURALGAS	GASOLINE	HEATING OIL	WTIA	BRENT CRUDE	GOLD	SILVER	PLATINUM	COPPER	PALLADIUM
COTTON	1.00																																									
SOYBEAN	0.01	1.00																																								
WHEAT	-0.05	0.02	1.00																																							
SUNFLOWER	-0.03	0.04	0.02	1.00																																						
CORN	0.01	0.63	0.04	0.05	1.00																																					
WHITE MAIZE	0.00	0.02	0.36	0.08	0.06	1.00																																			
YELLOW MAIZE	-0.02	0.02	0.36	0.06	0.06	0.86	1.00																																		
COFFEE	0.01	0.00	0.07	-0.02	0.04	0.02	0.03	1.00																																	
SUGAR	-0.04	0.00	0.06	0.00	0.01	0.04	0.04	0.29	1.00																																
ZARJPY	0.00	-0.05	-0.03	-0.01	-0.05	-0.01	-0.01	0.01	0.02	1.00																															
AUDZAR	0.00	0.04	0.01	0.00	0.03	0.01	0.02	-0.01	-0.02	-0.51	1.00																														
BWPZAR	0.04	0.02	-0.02	-0.01	0.01	-0.01	-0.03	0.00	-0.02	-0.05	0.06	1.00																													
CADZAR	0.01	0.04	0.00	0.01	0.06	0.03	0.04	-0.02	-0.02	-0.71	0.75	0.09	1.00																												
CHFZAR	0.02	0.05	0.02	0.00	0.05	-0.01	0.00	-0.02	-0.02	-0.84	0.61	0.06	0.75	1.00																											
CNYZAR	0.02	0.03	-0.03	-0.03	0.00	-0.03	-0.05	0.00	0.00	-0.06	0.08	0.76	0.09	0.07	1.00																										
EURZAR	0.01	0.01	-0.03	-0.02	-0.01	-0.04	-0.06	-0.01	0.00	-0.09	0.10	0.68	0.10	0.11	0.83	1.00																									
NZDZAR	0.00	0.02	0.02	0.00	0.02	0.00	0.01	-0.02	-0.03	-0.55	0.85	0.08	0.74	0.63	0.08	0.11	1.00																								
POUNDZAR	0.02	0.01	-0.04	-0.01	-0.02	-0.03	-0.05	-0.01	-0.01	-0.10	0.11	0.69	0.11	0.12	0.84	0.87	0.12	1.00																							
TKLZAR	0.05	0.03	-0.02	-0.02	-0.02	0.01	-0.01	0.00	-0.01	0.00	0.04	0.48	0.02	0.01	0.60	0.56	0.04	0.57	1.00																						
USDZAR	0.03	0.03	-0.03	-0.03	0.00	-0.03	-0.05	0.00	0.01	-0.07	0.08	0.76	0.09	0.08	0.98	0.84	0.07	0.86	0.60	1.00																					
FINDI30	0.01	-0.02	-0.02	-0.01	-0.02	-0.03	-0.02	0.01	0.02	0.06	-0.05	0.02	-0.05	-0.04	0.00	0.00	-0.06	-0.01	0.03	0.01	1.00																					
SWIXTOP40	0.00	-0.03	-0.01	-0.03	0.00	0.01	0.03	-0.02	0.00	0.03	0.01	-0.09	-0.01	-0.02	-0.07	-0.04	0.00	-0.04	-0.03	-0.07	-0.02	1.00																				
CAPPEDTOP40	0.01	-0.03	-0.01	-0.03	0.00	0.01	0.03	-0.02	0.01	0.03	0.01	-0.10	-0.01	-0.02	-0.07	-0.05	0.00	-0.05	-0.03	-0.07	-0.02	0.99	1.00																			
SAPROP	-0.01	-0.04	0.01	0.01	-0.03	-0.01	0.00	-0.02	0.02	0.02	-0.02	0.01	-0.02	-0.01	0.00	-0.02	-0.01	0.01	0.03	0.01	0.43	0.13	0.12	1.00																		
MIDCAP60	0.01	-0.04	0.00	-0.02	-0.03	-0.02	-0.01	0.00	-0.02	0.04	-0.02	0.02	-0.04	-0.02	0.01	0.01	-0.03	0.00	0.04	0.01	0.77	0.17	0.16	0.59	1.00																	
INDI25	0.01	-0.02	-0.03	-0.02	-0.02	-0.03	-0.02	0.01	0.02	0.05	-0.03	0.02	-0.04	-0.03	0.00	0.00	-0.04	-0.01	0.03	0.00	0.97	0.00	0.00	0.40	0.76	1.00																
RESI10	0.01	0.01	-0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.06	-0.04	0.06	-0.04	-0.04	0.03	0.02	-0.05	0.03	0.02	0.03	0.64	0.01	0.01	0.27	0.60	0.64	1.00															
GLDX	0.00	0.03	-0.02	-0.01	0.01	0.00	0.02	0.00	0.00	0.01	-0.02	0.06	-0.02	-0.02	0.04	0.04	-0.02	0.05	0.03	0.05	0.21	0.00	0.00	0.09	0.27	0.24	0.54	1.00														
GERE	0.02	-0.04	-0.01	-0.02	-0.04	-0.01	-0.02	0.01	-0.02	0.04	-0.01	0.02	-0.04	-0.02	0.00	0.01	-0.02	0.00	0.03	0.00	0.66	0.08	0.07	0.44	0.79	0.65	0.41	0.15	1.00													
ABI	0.01	-0.03	0.02	0.01	-0.02	-0.02	-0.01	0.01	0.00	0.06	-0.05	0.01	-0.05	-0.04	0.00	0.00	-0.07	-0.01	0.02	0.01	0.82	-0.03	-0.04	0.39	0.67	0.70	0.47	0.11	0.60	1.00												
ALSI	0.01	-0.01	-0.01	-0.01	-0.01	-0.02	0.00	0.00	0.00	0.06	-0.04	0.05	-0.04	-0.03	0.02	0.02	-0.05	0.01	0.03	0.02	0.88	0.01	0.02	0.40	0.77	0.87	0.92	0.43	0.60	0.69	1.00											
FINI5	0.02	-0.04	0.01	0.01	-0.02	-0.02	-0.02	0.01	0.01	0.06	-0.06	0.01	-0.05	-0.04	0.01	0.00	-0.06	-0.01	0.03	0.01	0.91	-0.01	-0.02	0.45	0.75	0.79	0.56	0.13	0.64	0.94	0.79	1.00										
TOP40	0.01	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.01	0.06	-0.04	0.05	-0.04	-0.04	0.02	0.02	-0.05	0.01	0.03	0.02	0.87	0.00	0.00	0.37	0.74	0.86	0.93	0.43	0.57	0.68	1.00	0.78	1.00									
NATURALGAS	0.00	-0.02	0.01	-0.01	-0.01	-0.02	-0.02	-0.01	-0.01	-0.04	0.04	-0.03	0.04	0.02	-0.01	-0.02	0.02	0.00	-0.02	-0.01	-0.02	-0.02	-0.01	-0.02	-0.01	-0.02	-0.01	-0.01	-0.02	-0.01	-0.02	-0.01	-0.02	1.00								
GASOLINE	0.02	0.02	0.01	-0.01	0.01	0.02	0.00	0.00	-0.01	0.01	0.03	-0.02	-0.02	-0.02	-0.02	-0.01	0.00	-0.03	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.03	-0.05	-0.05	-0.02	-0.01	-0.04	-0.01	-0.04	0.21	1.00							
HEATING OIL	0.01	0.02	-0.02	-0.01	0.01	0.00	0.01	-0.01	0.00	0.01	0.03	-0.03	0.00	0.00	-0.03	-0.02	0.00	-0.03	-0.02	-0.02	-0.02	-0.01	-0.01	-0.03	-0.03	-0.03	-0.04	-0.04	-0.01	-0.02	-0.04	-0.02	-0.04	0.29	0.77	1.00						
WTIA	0.02	-0.02	0.02	0.01	-0.01	0.02	0.01	-0.03	-0.01	-0.01	-0.03	0.02	0.00	-0.01	-0.02	0.00	0.01	0.00	-0.01	-0.02	-0.01	-0.01	-0.02	-0.02	-0.04	-0.02	-0.02	-0.02	-0.02	0.01	-0.02	0.00	-0.02	0.03	0.04	0.05	1.00					
BRENT CRUDE	0.00	0.04	0.00	0.00	0.03	0.00	0.01	-0.03	-0.07	0.02	-0.04	0.00	-0.03	-0.02	0.00	0.02	-0.03	0.01	0.00	-0.01	0.04	-0.07	-0.07	0.00	0.03	0.04	0.06	0.03	0.02	0.03	0.06	0.03	0.06	-0.01	-0.01	0.00	-0.02	1.00				
GOLD	0.01	-0.03	-0.04	-0.06	-0.03	-0.03	-0.04	-0.01	-0.01	-0.04	0.03	0.44	0.06	0.06	0.51	0.56	0.04	0.54	0.33	0.51	0.03	0.00	-0.01	0.03	0.05	0.03	0.04	0.04	0.02	0.02	0.04	0.03	0.04	-0.04	0.00	-0.04	0.03	0.02	1.00			
SILVER	-0.02	-0.01	-0.02	-0.01	0.00	0.01	-0.01	-0.03	-0.01	-0.19	0.32	-0.08	0.27	0.27	-0.09	-0.05	0.30	-0.05	-0.03	-0.09	0.01	-0.03	-0.03	0.02	0.03	0.02	0.00	0.00	0.05	0.01	0.01	0.00	0.00	0.02	0.02	0.03	0.00	0.00	0.06	1.00		
PLATINUM	0.00	-0.01	-0.02	-0.03	-0.02	0.00	-0.03	0.01	-0.03	-0.11	0.10	0.43	0.13	0.12	0.43	0.49	0.11	0.49	0.34	0.43	0.04	-0.09	-0.10	0.01	0.04	0.04	0.05	0.04	0.04	0.01	0.05	0.03	0.05	-0.05	0.01	-0.03	0.02	0.02	0.69	0.04	1.00	
COPPER	0.00	0.01	0.00	0.03	0.02	-0.02	-0.01	0.01	0.03	0.01	-0.02	-0.02	-0.03	-0.02	-0.03	-0.03	-0.02	-0.04	-0.04	-0.04	-0.02	-0.01	-0.01	-0.04	-0.03	-0.02	-0.03	-0.01	-0.01	-0.02	-0.03	-0.02	-0.03	0.00	0.06	0.06	0.31	0.01	0.00	-0.02	0.00	1.00	
PALLADIUM	0.01	-0.03	-0.02	-0.02	-0.05	-0.03	-0.04	-0.01	-0.03	-0.06	0.09	0.27	0.09	0.08	0.24	0.33	0.09	0.31	0.24	0.23	0.03	-0.05	-0.05	0.00	0.05	0.03	0.06	0.03	0.05	0.01	0.05	0.02	0.05	-0.05	0.00	-0.03	-0.01	0.02	0.52	0.11	0.69	-0.02	1.00

8.2. Entry & Exit Days sensitivity analysis

Agriculture

Coffee

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
46.7%																		
1					19.6%	15.5%	14.4%	6.4%	6.0%	-6.9%		0.9%	1.6%	-8.3%	-7.1%	-1.5%	-4.5%	-6.7%
3					82.9%	63.0%	54.0%	47.6%	41.1%	37.4%	36.8%	35.8%	36.5%	33.3%	34.2%	30.0%	25.7%	31.6%
5					61.3%	55.1%	46.9%	41.5%	30.6%	27.6%								29.0%
10	114.4%				66.0%	46.7%												
15	85.9%				57.0%	49.7%												
20	80.2%					42.7%												
25	74.2%																	
30	70.1%																	
35																		
40																		
45																		
50																		
55																		
60																		
65																		
70																		
100	66.0%																	
200																		

Corn

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
66.3%																		
1						10.6%	11.8%	6.7%	5.8%	5.1%	3.3%	3.6%	3.0%	2.5%	1.2%	1.6%	0.8%	1.8%
3						62.6%	59.9%	59.2%	53.5%	54.9%	54.3%	48.5%	47.2%	48.0%	48.2%	48.3%	48.5%	37.3%
5						60.0%	56.4%	59.9%	50.9%	51.2%	50.9%	46.3%	43.3%	45.4%	45.5%	47.0%	47.3%	43.5%
10						66.3%	68.3%	57.2%	52.6%	55.9%	50.9%	50.8%	50.7%	50.9%	51.3%	51.6%	55.6%	56.2%
15						50.3%	48.5%	54.3%	47.8%	49.7%	47.3%	46.9%	46.2%	47.1%	47.4%	48.0%	49.6%	50.4%
20	87.2%					50.3%	48.9%	53.4%	40.6%	43.2%	40.3%	39.2%	38.8%	39.1%	39.4%	41.3%	46.6%	47.6%
25	82.0%						60.2%	63.6%	56.2%	57.0%	55.4%	55.9%	56.0%	56.3%	56.5%	57.0%	58.8%	62.4%
30	87.7%							63.1%	53.5%	55.2%	54.2%	54.9%	54.9%	55.2%	55.6%	55.9%	57.1%	57.7%
35	84.9%						68.8%	101.2%	50.4%	53.2%	48.1%	48.6%	46.1%	49.0%	52.4%	52.5%	55.9%	56.5%
40	82.3%						68.8%	101.8%		50.6%	44.3%	44.7%	44.6%	44.8%	45.2%	45.6%	53.4%	54.9%
45	84.6%							87.6%			45.5%	45.7%	46.2%	46.4%	46.8%	47.0%	55.4%	56.8%
50	85.7%						29.0%	93.5%			74.2%	46.0%	45.8%	46.5%	46.6%	46.8%	53.7%	56.7%
55	63.8%						29.0%	93.5%			74.2%		45.1%	45.3%	45.7%	45.9%	47.2%	54.8%
60	67.7%						29.0%	83.3%			45.1%	44.2%	45.1%	45.3%	45.7%	45.9%	47.2%	54.8%
65	63.7%						29.0%	83.3%			49.0%	44.2%	44.5%	44.5%	45.3%	45.5%	46.7%	52.3%
70	65.9%						29.0%	70.5%			35.8%	46.1%	46.2%			45.0%	46.3%	51.5%
100	67.9%						29.0%	70.5%								32.1%	45.6%	45.9%
200	-1.8%						84.5%	21.5%			-1.4%	33.2%	33.3%					35.0%

Cotton

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
63.7%																		
1						14.8%	14.3%	15.0%	12.6%	12.1%	12.8%	12.4%	9.9%	11.0%	8.2%	9.3%	8.5%	11.3%
3						63.5%	61.9%	62.7%	61.3%	59.4%	55.9%	55.2%	52.2%	51.8%	51.6%	52.0%	48.4%	48.9%
5						63.9%	64.4%	64.1%	63.4%	62.2%	60.1%	59.0%						49.0%
10						63.7%	61.8%				61.5%							
15						59.9%	59.5%											
20	72.3%						59.2%											
25	76.6%																	
30	65.9%																	
35	77.5%																	
40	83.2%																	
45	83.8%																	
50	83.7%																	
55	79.1%																	
60	78.5%																	
65	67.3%																	
70	68.1%																	
100	61.3%																	
200	47.2%																	

Soybean

CAGR

Exit days \ Entry days	28.9%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1					6.4%	6.2%	6.0%	7.0%	6.4%	4.7%	3.3%	3.8%	4.7%	4.4%	3.5%	3.1%	3.0%	3.0%	2.3%
3					33.6%	31.6%	30.7%	30.3%	29.2%	26.6%	25.6%	25.6%	25.2%	25.1%	24.5%	22.9%	22.6%	18.7%	13.0%
5					30.8%	29.3%	28.6%	27.9%	27.1%	22.5%	20.6%	21.6%	20.3%	20.7%	18.0%	13.9%	13.1%	12.3%	10.4%
10	34.2%				29.9%	29.6%	28.9%	29.2%	28.7%	22.9%	22.3%	23.8%	23.3%	23.7%	21.9%	16.6%	14.7%	12.1%	
15	32.3%					27.6%	27.2%	26.9%	26.6%	18.9%	14.8%	17.2%	15.7%	16.3%	13.4%	10.2%			
20	32.2%						25.7%	26.0%	25.4%	16.8%	12.5%	15.7%	15.0%	16.6%	12.0%				
25	32.8%							28.3%	27.6%	21.9%	19.5%	21.1%	18.4%	22.0%	18.5%	14.2%			
30	31.4%								24.2%	16.7%	13.1%	16.4%	12.5%	16.8%	13.1%	12.3%			
35	29.6%									15.4%	11.6%	12.2%	12.4%	12.9%	12.7%				
40	28.4%										10.9%	13.8%	11.6%	13.2%	11.9%				
45	29.1%											12.4%	12.7%	13.1%	12.9%				
50	28.7%												12.1%	12.5%	12.2%				
55	28.9%													9.8%	9.7%				
60	27.8%														7.6%				
65	27.7%																		
70	27.4%																		
100	24.3%													14.5%	15.4%	15.4%			
200	17.3%														13.7%	13.8%			

Sugar

CAGR

Exit days \ Entry days	57.8%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1							10.0%	12.3%	11.2%	10.7%	11.2%	10.2%	8.0%	7.2%	7.5%	6.4%	7.0%	8.6%	0.0%
3							66.9%	64.8%	59.5%	56.8%	56.0%	54.9%	50.5%	43.2%	43.0%	40.8%	40.6%	41.5%	27.6%
5							50.8%	51.5%	44.4%	43.6%	43.7%	42.2%	41.3%	35.8%	35.7%	36.3%	36.9%	39.6%	22.1%
10	89.6%						57.8%	56.2%	52.2%	49.7%	50.4%	49.5%	45.6%	36.9%	37.0%	37.6%	40.4%	40.1%	15.3%
15	93.1%						79.8%	65.4%	62.2%	52.1%	47.9%	46.5%	42.1%	34.0%	34.2%	34.9%	37.9%	37.8%	15.2%
20	94.0%						84.3%	78.8%	71.0%	65.7%	52.5%	50.8%	46.1%	41.3%	41.5%	42.0%	44.3%	44.8%	15.1%
25	94.9%							75.8%	73.7%	61.8%	49.6%	48.8%	44.9%	40.0%	40.3%	40.9%	42.7%	43.6%	3.2%
30	92.1%								63.9%	65.5%	50.8%	50.1%	46.7%	42.1%	42.3%	42.9%	44.8%	45.5%	-4.5%
35	90.5%									71.1%	58.2%	58.0%	52.9%	46.1%	46.1%	47.0%	49.0%	50.9%	27.6%
40	94.0%										57.2%	57.7%	51.7%	45.8%	45.8%	46.5%	48.5%	48.3%	26.6%
45	93.4%											48.5%	48.3%	44.2%	44.2%	45.0%	46.9%	47.5%	23.8%
50	62.4%										31.0%	31.6%	43.1%	41.6%	41.7%	41.9%	41.8%	44.4%	20.1%
55	60.7%										52.5%	52.7%		37.2%	37.4%	38.5%	38.3%	40.8%	5.6%
60	61.3%										51.8%	52.3%		37.2%	37.4%	38.5%	38.3%	40.8%	5.6%
65	61.7%						41.2%				51.8%	52.3%	65.4%	27.9%	28.0%	36.6%	36.6%	39.3%	0.8%
70	60.9%						41.2%				36.2%	37.0%	36.0%	11.6%	12.0%		33.5%	36.5%	-1.9%
100	48.5%						41.2%				36.2%	37.0%	37.6%	11.6%	12.0%	14.5%	20.4%	29.4%	-1.9%
200	27.8%						20.8%	19.0%	-1.7%	12.0%			-29.4%	-25.6%	0.0%	0.0%	0.0%	0.0%	

Sunflower seeds

CAGR

Exit days \ Entry days	63.0%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1							11.3%	11.5%	11.4%	10.2%	8.8%	8.4%	8.7%	7.9%	8.4%	8.1%	8.3%	7.8%	6.4%
3							65.8%	64.6%	64.4%	63.3%	62.1%	60.9%	59.9%	59.2%	58.7%	58.3%	57.7%	56.8%	52.2%
5							63.5%	62.9%	62.6%	60.9%	60.0%	59.1%	58.5%	57.8%	57.4%	57.1%	56.6%	56.9%	53.0%
10							63.0%	62.5%	61.9%	60.4%	59.0%	58.3%	57.0%	56.0%	55.6%	55.7%	55.8%	56.3%	47.4%
15							61.0%	60.2%	59.9%	58.6%	57.5%	57.2%	55.9%	55.1%	54.6%	54.7%	54.8%	54.8%	43.1%
20	63.4%						60.3%	59.5%	59.6%	58.1%	56.6%	56.4%	54.4%	53.5%	53.0%	53.1%	53.2%	53.1%	41.9%
25	62.7%						62.1%	60.0%	59.7%	58.1%	56.8%	56.8%	54.6%	54.2%	53.9%	54.1%	54.2%	53.8%	44.2%
30	61.8%						68.2%		60.0%	58.6%	57.3%	57.3%	55.3%	55.1%	54.9%	55.1%	55.2%	53.8%	41.1%
35	60.1%						62.6%			57.1%	56.0%	56.1%	54.1%	53.9%	53.7%	53.9%	54.0%	52.6%	40.6%
40	59.1%						41.1%				53.6%	53.8%	51.7%	51.6%	51.3%	51.5%	51.6%	49.8%	38.7%
45	58.0%						39.6%					54.1%	49.4%	49.3%	49.1%	49.3%	49.4%	49.0%	37.4%
50	59.2%						39.6%					59.0%	49.5%	49.3%	49.1%	49.3%	49.3%	48.7%	37.4%
55	58.3%						25.9%							46.4%	46.1%	46.3%	46.4%	45.6%	31.6%
60	57.9%						25.9%							53.3%	45.8%	46.0%	46.1%	47.3%	37.1%
65	57.1%						25.9%					45.2%	12.7%	53.3%	51.8%	46.1%	46.2%	47.4%	37.1%
70	55.9%						25.9%					39.6%	25.1%				47.9%	44.9%	37.1%
100	51.6%						14.0%				-2.2%		2.4%					42.2%	38.0%
200	24.2%						27.8%			21.6%	-2.2%		2.4%				-1.1%	-2.9%	19.2%

Wheat

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
50.7%																		
1					5.5%	4.6%	2.8%	3.2%	3.4%	3.5%	4.2%	3.6%	3.4%	4.2%	3.8%	4.1%	4.5%	5.7%
3					60.5%	59.1%	57.2%	55.3%	54.6%	53.7%	53.6%	53.3%	53.0%	53.1%	52.2%	52.1%	48.4%	42.2%
5					58.0%	56.4%	54.8%	52.7%	52.5%	52.2%	51.6%	52.3%	52.8%	53.3%	52.9%	52.8%	47.7%	41.5%
10					57.3%	50.7%	52.5%	48.9%	49.4%	49.7%	50.1%	50.9%	51.8%	52.4%	52.0%	52.0%	47.2%	40.6%
15	59.8%				50.3%	39.6%	46.0%	41.4%	44.3%	44.7%	45.2%	45.4%	46.6%	47.2%	47.0%	46.9%	42.1%	36.8%
20	60.5%					42.7%	50.0%	37.8%	39.6%	40.0%	42.4%	42.5%	45.4%	46.4%	46.5%	46.4%	38.1%	37.8%
25	59.0%						46.8%	33.3%	36.9%	40.8%	41.5%	41.7%	43.0%	43.7%	43.9%	43.8%	35.1%	34.7%
30	57.4%							39.4%	39.9%	40.3%	43.0%	46.1%	47.2%	48.1%	48.7%	48.7%	34.0%	33.6%
35	55.8%								41.6%	41.7%	43.6%	45.1%	47.5%	48.8%	48.9%	48.9%	33.3%	32.5%
40	51.5%									40.5%	42.2%	43.7%	45.9%	47.3%	47.4%	47.3%	31.1%	28.7%
45	52.7%										43.2%	43.6%	45.4%	46.8%	47.9%	48.2%	38.3%	36.9%
50	52.2%											43.5%	43.9%	45.9%	46.9%	47.1%	38.3%	37.0%
55	52.0%									43.9%			44.0%	45.2%	45.3%	45.6%	37.9%	36.6%
60	54.0%									57.5%	57.1%	57.1%	52.3%	50.8%	50.8%	51.0%	37.9%	36.6%
65	53.1%									54.0%	53.4%	53.5%	53.6%		47.4%	47.7%	36.5%	32.1%
70	52.8%									54.0%	53.4%	53.5%	53.6%			47.2%	36.1%	31.8%
100	43.2%									27.8%				29.7%	40.0%	40.3%	41.3%	38.5%
200	41.2%								-0.8%	-0.6%				-0.4%	-0.4%	-0.4%	0.0%	32.6%

White Maize

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
46.2%																		
1					8.0%	5.5%	5.8%	5.3%	5.5%	3.6%	3.2%	3.3%	3.9%	3.8%	3.9%	4.0%	4.2%	5.3%
3					49.6%	48.2%	46.1%	45.5%	44.5%	43.6%	42.2%	41.4%	41.3%	40.8%	40.6%	40.6%	39.1%	34.3%
5					49.2%	47.2%	46.2%	45.3%	44.7%	43.7%	43.1%	42.3%	42.5%	42.1%	41.9%	42.0%	40.9%	37.8%
10					48.8%	46.2%	45.3%	44.5%	44.0%	44.9%	44.7%	44.3%	44.5%	43.1%	42.5%	42.4%	42.1%	37.4%
15	53.6%				47.2%	46.7%	46.0%	45.6%	45.3%	45.6%	44.1%	43.9%	46.1%	43.4%	43.4%	42.4%	42.0%	37.7%
20	52.4%					45.0%	44.3%	43.7%	43.8%	45.6%	44.3%	44.7%	44.9%	42.6%	42.7%	42.7%	41.7%	36.7%
25	51.0%						43.2%	41.7%	41.9%	42.9%	41.9%	41.5%	41.6%	40.8%	41.0%	40.4%	40.6%	34.9%
30	48.9%							40.9%	41.5%	43.2%	42.0%	42.3%	43.5%	40.8%	40.9%	40.3%	39.4%	33.4%
35	48.9%								43.8%	44.6%	44.2%	44.4%	45.4%	43.2%	43.3%	42.8%	41.5%	37.5%
40	42.3%									38.1%	37.0%	37.8%	36.6%	36.5%	36.6%	36.7%	34.7%	26.4%
45	40.3%									19.3%	34.4%	33.1%	33.7%	33.8%	34.0%	34.0%	31.1%	21.2%
50	39.3%									51.1%		32.4%	32.9%	33.0%	33.2%	33.3%	30.1%	20.4%
55	38.1%								42.5%	39.2%	23.7%	22.7%	35.4%	35.5%	35.7%	35.7%	33.1%	24.1%
60	39.9%								42.5%	38.2%	38.6%	13.9%	33.9%	38.8%	39.0%	39.0%	36.6%	21.9%
65	39.6%								42.5%				41.8%	41.7%	38.8%	38.8%	36.3%	21.9%
70	39.5%								42.5%				41.8%	41.7%	45.6%	38.7%	36.1%	21.9%
100	34.4%								27.4%	13.9%	14.4%	13.5%	16.7%	16.8%			34.7%	20.2%
200	16.5%								16.9%	-0.6%	-0.5%	13.5%	14.0%	14.1%	17.4%	17.4%		19.7%

Yellow Maize

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
46.0%																		
1					5.9%	4.0%	4.7%	3.2%	4.1%	3.6%	3.1%	3.3%	3.9%	3.6%	3.7%	3.4%	3.3%	3.0%
3					48.7%	47.4%	46.2%	45.3%	44.6%	43.4%	43.1%	42.5%	41.7%	39.7%	40.1%	39.5%	38.9%	32.9%
5					49.6%	48.4%	47.0%	46.1%	45.8%	45.1%	44.8%	44.4%	43.9%	42.7%	42.7%	40.7%	39.1%	36.1%
10					47.2%	46.0%	45.1%	44.0%	44.0%	43.9%	43.6%	43.8%	42.6%	41.8%	41.9%	39.8%	37.6%	31.4%
15	52.2%				48.9%	48.2%	47.7%	47.0%	46.8%	46.7%	46.5%	46.7%	46.2%	45.1%	45.2%	43.1%	40.7%	34.7%
20	50.7%					47.3%	46.9%	46.4%	45.9%	45.8%	45.6%	45.8%	44.0%	43.7%	43.9%	41.3%	40.2%	33.2%
25	48.9%						47.1%	46.8%	46.3%	45.8%	45.6%	45.8%	44.4%	42.8%	42.9%	40.5%	38.8%	32.4%
30	47.6%							45.4%	45.3%	45.0%	44.8%	43.8%	42.7%	42.1%	42.1%	39.5%	37.7%	30.9%
35	47.6%								49.1%	48.7%	48.9%	47.5%	47.4%	47.0%	47.0%	43.9%	44.2%	38.4%
40	40.4%									44.2%	44.5%	44.7%	42.2%	39.8%	39.8%	37.0%	37.5%	31.9%
45	40.1%									46.7%	43.5%	43.7%	41.2%	38.4%	38.6%	35.6%	36.0%	30.1%
50	40.2%											44.0%	41.5%	38.9%	38.9%	36.1%	36.4%	30.4%
55	40.5%												43.1%	40.6%	40.6%	38.0%	37.2%	33.5%
60	42.1%													39.9%	40.0%	37.8%	36.7%	31.5%
65	42.1%													42.3%	40.0%	37.8%	36.7%	31.5%
70	41.9%												36.1%			37.0%	36.5%	31.5%
100	38.1%										15.9%	15.9%					37.7%	31.0%
200	16.7%									15.6%	15.9%	15.9%	15.0%	15.0%	15.1%	15.1%		20.8%

Currencies

AUD/ZAR

CAGR	Entry days																	
Exit days	5.5%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1							-0.1%	0.0%	0.0%	-0.1%	-0.4%	-0.1%	-0.1%	-0.1%	0.0%	-0.2%	-0.1%	0.0%	0.3%
3							6.5%	6.1%	5.6%	5.7%	5.5%	5.5%	5.2%	5.1%	5.2%	5.3%	5.4%	5.3%	4.2%
5							5.9%	5.0%	4.8%	5.1%	5.0%	5.0%	4.8%	4.8%	4.8%	4.9%	5.0%	5.0%	4.1%
10							5.5%	5.0%	4.9%	5.3%	5.2%	5.3%	5.1%	5.0%	5.2%	5.4%	5.5%	5.6%	4.2%
15							4.3%	3.9%	3.6%	4.1%	4.1%	4.2%	4.0%	3.9%	4.2%	4.4%	4.6%	4.8%	3.8%
20	6.8%						3.4%	3.1%	2.9%	3.4%	3.1%	3.3%	3.0%	2.9%	3.2%	3.5%	3.7%	4.1%	3.1%
25	5.5%							1.6%	1.3%	1.8%	1.3%	1.5%	1.6%	1.6%	1.9%	2.3%	2.5%	3.0%	2.4%
30	5.1%								0.7%	1.1%	0.5%	0.7%	1.0%	1.0%	1.5%	1.9%	2.2%	2.7%	2.2%
35	4.8%									0.5%	0.1%	0.4%	0.6%	0.6%	1.2%	1.6%	1.8%	2.4%	2.0%
40	4.4%						13.5%	7.9%	3.5%		0.9%	0.3%	0.8%	0.7%	1.3%	1.7%	1.9%	2.5%	1.6%
45	4.7%						13.5%	14.2%	5.5%			1.4%	1.8%	1.7%	2.2%	2.4%	2.7%	3.2%	2.5%
50	4.4%						13.2%	12.4%	7.9%	3.6%	-1.4%	8.8%	1.1%	1.1%	1.5%	1.8%	2.1%	2.6%	2.1%
55	4.4%						13.2%	12.4%	7.9%	3.6%	-1.4%	9.0%	3.4%	0.8%	1.3%	1.6%	1.9%	2.4%	2.1%
60	4.0%							12.5%	7.9%	8.3%	11.2%	9.4%	3.4%	0.8%	1.3%	1.6%	1.9%	2.4%	2.1%
65	4.3%						9.8%	12.5%	7.9%	8.3%	11.2%	9.4%	3.0%	0.3%		1.7%	2.0%	2.5%	2.2%
70	5.2%						9.4%	12.2%	8.1%	8.3%	6.0%	9.4%	3.0%	2.9%		4.0%	2.0%	2.5%	2.2%
100	5.7%						6.7%				6.1%	3.1%	3.3%	11.2%				3.4%	1.5%
200	6.0%						5.8%	5.5%	-10.1%	-9.9%									-1.9%

BWP/ZAR

CAGR	Entry days																	
Exit days	-2.3%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						-0.9%	-0.8%	-0.7%	-0.7%	-0.6%	-0.6%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.4%	-0.2%
3						-1.7%	-1.6%	-1.4%	-1.3%	-1.2%	-1.1%	-1.0%	-0.9%	-0.9%	-0.9%	-0.8%	-0.8%	-0.6%	-0.3%
5						-2.2%	-2.1%	-1.9%	-1.8%	-1.6%	-1.6%	-1.4%	-1.4%	-1.4%	-1.3%	-1.3%	-1.2%	-1.1%	-0.6%
10						-2.5%	-2.3%	-2.1%	-2.0%	-1.8%	-1.7%	-1.5%	-1.4%	-1.3%	-1.3%	-1.3%	-1.3%	-1.2%	-0.7%
15	-3.8%	10.5%				-2.7%	-2.4%	-2.2%	-2.1%	-1.8%	-1.7%	-1.5%	-1.5%	-1.4%	-1.4%	-1.4%	-1.3%	-1.2%	-0.7%
20	-4.0%	8.8%				-9.7%	-2.5%	-2.2%	-2.1%	-1.9%	-1.7%	-1.5%	-1.6%	-1.4%	-1.4%	-1.4%	-1.3%	-1.2%	-0.7%
25	-4.2%	7.1%				-1.3%	-6.2%	-2.2%	-2.1%	-1.9%	-1.7%	-1.5%	-1.6%	-1.4%	-1.4%	-1.4%	-1.3%	-1.2%	-0.7%
30	-4.2%	6.3%				-11.0%	-22.2%	-12.7%	-2.2%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
35	-4.2%	4.4%				-0.4%	2.4%	-3.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
40	-4.2%	1.5%				-0.3%	2.6%	-3.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
45	-4.2%	1.0%				-0.7%	2.7%	-3.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
50	-3.8%	3.5%				-0.7%	2.7%	-3.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
55	-4.0%	3.5%				-0.7%	2.8%	-3.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
60	-4.0%	2.9%				-0.6%	2.8%	-3.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
65	-4.0%	2.4%				0.3%	3.5%	-3.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.6%	-1.4%	-1.4%	-1.4%	-1.4%	-1.2%	-0.7%
70	-3.9%	1.7%				0.9%	4.6%	-1.8%	-0.3%	-0.4%	-0.3%	-0.1%	0.0%	0.1%	0.1%	0.1%	-1.4%	-1.2%	-0.7%
100	-3.8%	-0.9%				-0.9%	2.0%	-3.8%	-3.6%	-0.4%	-0.3%	-0.1%	0.0%	0.1%	0.1%	0.1%	-1.4%	-1.2%	-0.7%
200	-3.6%	3.5%				1.6%	-1.6%	-1.0%	1.3%	0.4%	0.6%	0.7%	0.8%	0.9%	-0.3%	-0.3%	-0.2%	-0.1%	-0.7%

CAD/ZAR

CAGR	Entry days																	
Exit days	4.0%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1							-0.2%	-0.5%	-0.6%	-0.6%	-0.6%	-0.8%	-0.6%	-0.6%	-0.5%	-0.5%	-0.4%	-0.3%	-0.3%
3							7.8%	7.1%	7.1%	6.7%	6.7%	6.4%	6.7%	6.7%	6.7%	6.4%	6.4%	6.0%	5.3%
5	11.2%						5.7%	5.3%	4.9%	4.4%	5.1%	5.1%	5.5%	5.6%	5.6%	5.7%	5.8%	5.4%	4.8%
10	9.3%						4.0%	3.8%	3.5%	2.5%	4.0%	4.2%	4.2%	4.5%	4.2%	4.2%	4.4%	4.0%	4.4%
15	9.1%						2.5%	2.8%	3.2%	2.3%	4.2%	4.4%	4.0%	4.3%	4.2%	4.3%	4.5%	4.1%	4.8%
20	7.7%						-0.4%	0.4%	1.3%	0.2%	2.6%	2.8%	2.4%	2.7%	2.6%	2.8%	3.1%	2.8%	3.5%
25	7.4%							-0.7%	0.2%	-1.0%	1.6%	1.7%	1.0%	1.3%	1.3%	1.5%	1.9%	1.6%	2.8%
30	7.1%								-0.4%	-1.2%	1.4%	1.6%	0.9%	1.2%	1.2%	1.5%	1.8%	1.6%	2.9%
35	6.2%									-2.7%	0.4%	0.8%	-0.1%	0.2%	0.3%	0.5%	0.9%	0.6%	2.1%
40	7.3%									2.7%	1.8%	2.0%	1.3%	1.6%	1.6%	1.8%	2.2%	1.9%	3.2%
45	7.3%											1.9%	1.1%	1.4%	1.5%	1.7%	2.0%	1.0%	2.4%
50	6.5%											8.8%	2.1%	2.3%	2.3%	2.5%	2.8%	2.0%	3.3%
55	6.8%											8.8%		2.3%	2.2%	2.4%	2.7%	1.9%	3.2%
60	7.0%														1.9%	2.1%	2.4%	1.7%	2.9%
65	6.9%															1.0%	1.4%	0.5%	2.0%
70	6.8%																0.7%	-0.3%	1.3%
100	5.8%																	-1.4%	0.3%
200	-2.4%												-3.7%					-10.8%	0.6%

CHF/ZAR

CAGR	Entry days																	
6.1%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						-0.5%	-0.6%	-0.5%	-0.3%	-0.5%	-0.7%	-0.5%	-0.5%	-0.4%	-0.3%	-0.2%	-0.1%	-0.2%
3						7.8%	7.7%	7.4%	6.9%	6.2%	5.9%	6.0%	6.0%	6.1%	6.0%	6.1%	6.1%	5.5%
5						6.1%	6.3%	6.3%	5.9%	5.4%	5.9%	6.2%	6.4%	6.5%	6.4%	6.6%	7.0%	5.0%
10						6.1%	6.1%	6.1%	6.1%	5.8%	6.3%	6.6%	6.8%	6.7%	6.7%	6.9%	7.3%	5.0%
15						5.4%	5.6%	5.6%	5.6%	5.8%	6.5%	6.8%	7.0%	6.9%	6.8%	7.0%	7.5%	4.2%
20	9.3%					5.1%	5.0%	5.3%	5.0%	5.2%	5.9%	6.2%	6.4%	6.4%	6.3%	6.5%	7.0%	3.2%
25	8.4%						4.5%	4.8%	4.6%	4.8%	5.5%	5.9%	6.1%	6.1%	6.0%	6.2%	6.7%	2.8%
30	8.3%							4.6%	4.4%	4.6%	5.4%	5.7%	6.0%	5.9%	5.8%	6.0%	6.6%	2.5%
35	7.4%						0.2%		3.8%	3.9%	4.8%	5.2%	5.4%	5.3%	5.2%	5.4%	6.0%	1.2%
40	7.0%									3.6%	4.4%	4.8%	5.1%	5.0%	4.8%	5.1%	5.7%	1.0%
45	7.4%										4.5%	4.9%	5.1%	4.9%	4.8%	5.0%	5.7%	0.5%
50	7.4%											5.6%	5.8%	4.7%	4.6%	4.8%	5.4%	0.4%
55	7.4%												6.6%	5.6%	3.1%	3.4%	4.2%	0.1%
60	5.7%													3.6%	3.1%	3.4%	4.1%	0.1%
65	5.8%								6.0%						3.0%	3.3%	4.1%	-0.1%
70	5.7%								6.0%						3.0%	3.3%	4.1%	-0.1%
100	5.0%					4.8%			6.2%	5.2%	6.5%	6.3%					4.1%	0.1%
200	4.4%					3.9%			6.7%	6.8%	5.9%						3.5%	3.3%

Exit days

CNY/ZAR

CAGR	Entry days																	
1.8%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1	1.2%	0.4%	0.1%	0.5%	0.3%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
3	2.9%	1.5%	0.8%	0.0%	0.4%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
5	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
10	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
15	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
20	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
25	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
30	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%		0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
35	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
40	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
45	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
50	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
55	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
60	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%		0.4%	0.4%	0.4%	0.4%	0.4%
65	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%		0.4%	0.4%	0.4%	0.4%	0.4%
70	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%		0.4%	0.4%	0.4%	0.4%	0.4%
100	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
200	3.0%	1.6%	0.8%	0.0%	0.5%	0.3%	0.2%	0.1%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%

Exit days

EUR/ZAR

CAGR	Entry days																	
10.2%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1					0.9%	0.6%	0.6%	0.2%	0.2%	-0.2%	-0.7%	-0.5%	-0.5%	-0.6%	-0.5%	-0.5%	-0.1%	0.2%
3					12.6%	12.1%	11.4%	10.5%	9.8%	8.8%	7.7%	7.7%	7.8%	7.7%	7.7%	7.9%	8.1%	7.5%
5					10.2%	9.5%	9.2%	8.0%	7.3%	6.3%	5.8%	6.2%	6.1%	6.0%	6.0%	6.3%	6.9%	6.9%
10		30.6%			10.4%	10.2%	9.5%	8.4%	7.3%	6.7%	6.7%	7.3%	7.0%	6.6%	6.7%	7.0%	7.5%	6.4%
15	13.6%	28.7%			10.2%	10.1%	9.5%	7.3%	6.8%	5.5%	5.7%	6.3%	6.2%	6.0%	6.2%	6.5%	7.3%	6.5%
20	13.1%	26.5%				9.4%	9.0%	6.4%	5.5%	4.4%	4.5%	5.2%	5.3%	5.5%	5.7%	6.0%	6.9%	5.3%
25	12.1%						6.8%	6.4%	5.0%	4.8%	5.4%	5.9%	6.0%	6.4%	6.6%	6.9%	7.7%	6.0%
30	12.0%							5.0%	3.9%	3.9%	5.1%	5.7%	5.8%	6.2%	6.4%	6.7%	7.5%	5.9%
35	11.2%								2.7%	2.6%	3.9%	4.6%	4.7%	5.2%	5.3%	5.7%	6.5%	4.6%
40	10.4%				9.6%					1.7%	3.2%	3.8%	3.9%	4.4%	4.6%	5.0%	5.9%	3.9%
45	10.4%				2.4%					7.7%	4.9%	5.5%	5.5%	5.9%	6.1%	6.4%	7.2%	4.2%
50	10.5%				2.4%					7.7%	6.9%	5.5%	5.5%	5.9%	6.0%	6.4%	7.1%	4.2%
55	10.4%				-2.0%								5.6%	6.0%	6.1%	6.4%	7.2%	4.2%
60	9.8%				-2.0%								9.6%	5.7%	5.8%	6.2%	7.0%	4.2%
65	9.5%				12.0%										5.4%	5.8%	6.6%	3.7%
70	9.9%				13.9%										9.3%	5.8%	6.6%	3.7%
100	8.2%	16.7%			11.1%					16.3%		17.3%			9.7%	9.9%	7.0%	3.4%
200	6.5%				12.2%								15.5%	10.3%	10.3%	10.4%		1.1%

Exit days

GBP/ZAR

CAGR	Entry days																	
13.9%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						1.7%	1.3%	1.4%	1.1%	1.0%	0.8%	0.4%	0.2%	0.1%	0.3%	0.3%	0.4%	0.5%
3						13.4%	12.5%	12.4%	11.8%	11.4%	11.1%	10.8%	10.6%	10.6%	10.8%	10.7%	10.6%	8.8%
5						13.8%	12.7%	12.4%	11.9%	11.7%	11.4%	11.0%	11.1%	11.2%	11.3%	10.0%	10.2%	7.9%
10						13.9%	12.2%	11.8%	10.8%	10.2%	9.4%	8.6%	8.8%	9.2%	9.4%	8.8%	9.0%	5.9%
15						12.1%	11.4%	11.0%	9.6%	9.0%	8.2%	7.4%	7.9%	8.3%	8.6%	8.8%	9.2%	7.1%
20	12.7%					13.2%	12.3%	12.0%	10.3%	9.8%	9.3%	6.9%	7.4%	7.8%	8.2%	8.4%	8.8%	6.1%
25	11.4%						10.9%	10.4%	8.7%	8.6%	8.3%	5.5%	6.1%	6.6%	6.9%	7.2%	7.7%	5.2%
30	9.9%							9.4%	7.3%	7.2%	7.6%	6.2%	6.8%	7.2%	7.5%	7.8%	8.2%	4.9%
35	9.5%						8.8%		6.3%	6.6%	7.0%	5.4%	6.1%	6.6%	6.9%	7.2%	7.7%	4.0%
40	9.0%						7.5%			6.5%	6.8%	5.5%	6.2%	6.6%	7.0%	7.2%	7.8%	4.0%
45	8.4%						13.7%				8.3%	7.5%	8.0%	8.3%	8.6%	8.8%	9.3%	4.0%
50	8.4%											7.5%	8.0%	8.3%	8.6%	8.8%	9.4%	3.7%
55	8.0%												7.9%	8.2%	8.5%	8.7%	9.3%	3.6%
60	5.0%													8.3%	8.6%	8.8%	9.3%	3.6%
65	6.2%														8.2%	8.4%	8.9%	3.3%
70	6.2%														11.2%	8.1%	8.7%	3.3%
100	7.1%												3.7%				10.7%	3.1%
200	-6.8%					-0.3%	-0.3%	8.6%				-0.2%	5.5%	-0.1%	-0.1%	-0.1%	6.8%	5.0%

Exit days

NZD/ZAR

CAGR	Entry days																	
8.6%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						0.3%	0.2%	0.2%	-0.3%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.4%
3						10.1%	9.6%	8.1%	6.9%	6.5%	5.9%	5.7%	5.2%	5.0%	5.1%	5.2%	5.4%	3.6%
5						10.5%	9.7%	8.3%	7.6%	6.3%	5.5%	5.3%	4.9%	4.0%	4.0%	3.7%	4.2%	2.7%
10	11.5%	37.9%				8.6%	8.2%	6.9%	5.8%	4.6%	4.0%	3.5%	2.6%	1.9%	1.9%	2.1%	3.9%	3.1%
15	10.1%	35.1%				6.1%	5.7%	4.5%	3.6%	2.4%	1.9%	1.9%	1.1%	0.3%	0.3%	0.6%	2.4%	1.8%
20	10.4%	33.2%				7.9%	7.8%	5.3%	4.7%	4.0%	3.7%	3.7%	3.3%	2.6%	2.7%	2.9%	4.4%	4.2%
25	7.1%	35.3%					2.9%	1.6%	2.0%	1.1%	0.6%	0.5%	0.3%	-0.6%	-0.2%	0.1%	2.0%	1.9%
30	6.5%	33.6%				11.0%		-0.2%	0.9%	0.0%	-0.5%	-0.2%	-0.5%	-1.4%	-1.0%	-0.7%	1.3%	1.9%
35	5.6%	33.1%							1.3%	0.5%	-0.8%	-0.5%	-0.7%	-1.4%	-1.1%	-0.8%	1.2%	1.9%
40	3.8%	27.2%								-0.3%	-2.2%	-1.7%	-1.7%	-2.5%	-2.2%	-1.9%	0.3%	1.4%
45	4.1%	28.3%									2.7%	3.0%	2.9%	-3.1%	-2.8%	-2.4%	-0.2%	1.4%
50	3.0%	20.5%								-15.5%	-19.3%	2.5%	2.4%	-3.9%	-3.5%	-3.1%	-0.7%	0.9%
55	2.1%	21.2%								-19.0%	8.3%	18.9%	-4.3%	-4.2%	-3.8%	-3.5%	-1.0%	0.6%
60	1.5%	21.2%								-19.0%	8.3%	-17.5%	-6.1%	-5.4%	-5.0%	-4.6%	-2.0%	-0.2%
65	1.5%	21.2%				0.5%				-19.0%	8.3%	9.5%	-6.1%		-4.9%	-4.6%	-1.9%	-0.2%
70	1.4%	21.4%				0.5%			-3.4%	6.4%	8.3%	9.5%	-6.1%			-4.9%	-2.2%	-0.4%
100	1.2%	13.7%				1.1%			11.2%	9.3%	-3.7%	10.4%	-4.8%				-3.8%	-1.8%
200	3.1%	-5.8%				-0.4%	11.4%	11.4%	11.2%	9.3%	-3.7%	-3.4%	-1.9%	-2.1%	-2.0%	-1.9%	-2.4%	-2.6%

Exit days

TKL/ZAR

CAGR	Entry days																	
2.5%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						1.5%	1.5%	1.3%	1.0%	1.0%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.8%	0.6%
3						11.0%	10.6%	8.9%	8.4%	7.7%	6.9%	6.6%	6.3%	6.0%	6.2%	6.2%	5.0%	3.7%
5						7.1%	7.8%	6.2%	5.9%	5.3%	3.8%	2.9%	2.7%	2.1%	2.5%	2.5%	3.2%	2.7%
10						2.5%	3.9%	3.8%	2.9%	3.1%	1.6%	1.4%	1.4%	1.3%	1.7%	1.8%	2.6%	2.0%
15						1.7%	3.2%	4.3%	1.5%	2.0%	0.0%	0.3%	0.7%	1.0%	1.4%	1.4%	2.2%	1.1%
20	5.5%					-0.1%	1.0%	2.8%	-0.3%	0.0%	-1.0%	-0.7%	-0.3%	0.3%	0.7%	0.7%	1.6%	0.4%
25	4.9%						-1.1%	1.3%	-1.7%	-1.4%	-2.1%	-1.7%	-1.3%	-0.9%	-0.5%	-0.4%	0.5%	-0.8%
30	4.5%						22.8%	-0.3%	-3.2%	-2.2%	-2.3%	-1.9%	-1.7%	-1.1%	-0.7%	-0.6%	0.3%	-1.2%
35	3.2%						24.7%	13.1%	-4.9%	-3.5%	-2.9%	-2.5%	-2.1%	-1.5%	-1.2%	-1.1%	-0.3%	-1.2%
40	2.1%						24.5%			-3.7%	-3.1%	-2.7%	-2.3%	-1.9%	-1.4%	-1.3%	-0.6%	-1.3%
45	0.3%						8.5%	8.4%	-0.3%	-3.7%	-1.2%	-0.8%	-0.5%	0.0%	0.3%	0.4%	1.1%	0.4%
50	2.6%						2.9%	4.6%				-1.8%	-1.4%	-1.0%	-0.6%	-0.6%	0.3%	-0.5%
55	2.8%						2.9%	4.6%				-1.8%	-1.4%	-1.0%	-0.6%	-0.6%	0.3%	-0.5%
60	4.0%													-2.1%	-1.7%	-1.6%	-0.8%	-0.8%
65	4.0%													2.3%	-1.9%	-1.8%	-0.9%	-0.8%
70	5.3%													-0.2%	6.8%	5.9%	6.1%	-1.2%
100	5.4%													-0.2%	-0.1%		7.7%	-2.2%
200	-5.5%													-0.2%	-0.1%	-0.2%	-0.2%	-3.3%

Exit days

USD/ZAR

CAGR	Entry days																	
10.7%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
Exit days 1						1.0%	0.7%	0.4%	0.1%	0.2%	0.2%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	-0.1%
3						9.5%	9.1%	8.5%	8.2%	7.9%	7.7%	7.5%	7.4%	7.5%	7.6%	7.7%	7.4%	6.9%
5	12.0%					9.2%	8.8%	8.5%	8.2%	7.9%	7.8%	7.7%	7.6%	7.6%	7.8%	7.9%	7.3%	6.6%
10	11.1%					10.7%	9.3%	9.5%	9.0%	8.8%	8.6%	8.4%	8.1%	8.2%	8.4%	8.5%	8.3%	7.0%
15	11.6%	20.7%				10.9%	10.3%	10.5%	10.3%	10.0%	9.7%	9.6%	8.5%	8.6%	8.9%	9.0%	8.7%	7.3%
20	11.1%	23.0%				9.8%	9.6%	9.8%	9.7%	9.3%	8.9%	8.9%	7.5%	7.8%	8.0%	8.1%	7.8%	6.0%
25	10.1%	20.5%					9.9%	9.9%	9.8%	9.4%	9.2%	9.2%	8.0%	8.2%	8.4%	8.5%	8.3%	6.8%
30	9.2%	20.8%						9.9%	9.9%	9.4%	9.2%	9.2%	8.0%	8.2%	8.4%	8.5%	8.2%	6.8%
35	8.6%	16.1%							9.7%	9.4%	9.1%	9.1%	7.9%	8.1%	8.3%	8.4%	8.2%	6.4%
40	8.6%									9.0%	8.8%	8.7%	7.5%	7.7%	7.9%	8.1%	7.8%	6.0%
45	8.3%										9.1%	9.1%	8.8%	9.0%	9.2%	9.3%	9.1%	5.9%
50	8.4%											9.1%	8.8%	9.0%	9.2%	9.3%	9.4%	6.5%
55	8.1%												8.6%	8.8%	9.0%	9.1%	9.2%	6.4%
60	8.2%													9.3%	9.5%	9.6%	9.6%	7.2%
65	7.8%														9.1%	9.2%	9.2%	7.0%
70	7.8%														9.1%	9.2%	9.2%	7.0%
100	7.8%														9.2%	9.3%	10.8%	8.7%
200	-1.4%	11.8%												4.5%	3.9%	3.9%	3.4%	6.6%

ZAR/JPY

CAGR	Entry days																	
6.7%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
Exit days 1						1.2%	0.1%	0.1%	0.2%	-0.4%	-0.2%	0.1%	-0.1%	-0.1%	0.2%	0.4%	0.5%	0.1%
3						15.0%	14.1%	13.8%	12.8%	12.3%	12.2%	12.2%	11.9%	11.7%	11.7%	11.8%	11.2%	6.4%
5						9.1%	7.8%	8.4%	8.1%	8.0%	8.6%	8.6%	8.7%	8.4%	8.5%	8.8%	9.2%	5.0%
10	5.2%					6.7%	6.3%	7.7%	8.7%	6.0%	6.7%	7.0%	7.4%	7.8%	8.2%	8.6%	9.1%	2.0%
15	-1.7%					5.8%	2.5%	5.4%	6.2%	4.1%	5.0%	5.2%	5.7%	6.7%	7.6%	8.0%	6.4%	0.6%
20	-2.2%					10.7%	10.1%	10.7%	10.0%	6.6%	7.6%	8.1%	8.6%	9.1%	9.5%	9.8%	6.7%	1.1%
25	-8.9%						9.3%	10.0%	8.8%	4.8%	5.7%	3.7%	5.4%	6.1%	6.6%	7.2%	2.4%	-2.2%
30	-9.2%							8.7%	7.5%	3.3%	4.9%	2.7%	4.6%	5.4%	5.9%	6.6%	2.0%	-2.2%
35	-14.6%					25.1%	18.4%		5.9%	1.6%	3.0%	1.3%	2.1%	3.5%	4.8%	5.4%	1.2%	-3.0%
40	-16.4%					17.0%		20.8%	20.4%	0.6%	1.4%	0.0%	1.1%	2.0%	2.8%	4.0%	-0.4%	-3.3%
45	-13.2%						20.4%	25.9%	24.6%	15.4%	5.8%	4.7%	5.5%	6.5%	7.1%	7.8%	4.2%	0.8%
50	-11.4%						20.4%	25.9%	27.8%	18.3%	19.9%	4.6%	5.4%	6.3%	7.0%	7.6%	4.0%	0.8%
55	-11.4%						20.4%	25.9%	27.8%	18.3%	21.5%	11.1%	5.4%	6.3%	7.0%	7.6%	4.0%	0.8%
60	-11.4%						20.1%	27.3%	29.0%	21.1%	23.9%	11.1%	11.7%	7.6%	8.0%	8.3%	5.6%	0.8%
65	-11.2%						20.4%	27.5%	29.0%		24.0%	14.8%	15.2%	12.7%	7.6%	8.0%	5.0%	-0.1%
70	-12.5%						17.9%	26.3%	28.0%		25.3%	11.9%	12.4%	16.4%	5.1%	7.7%	4.8%	-0.3%
100	-6.4%						-6.2%	15.6%	23.7%		19.6%	19.6%	21.5%	19.9%	22.3%		5.7%	2.1%
200	-5.9%					10.5%	15.5%	4.1%	12.3%	-5.2%	15.7%	15.7%	17.7%	15.4%	15.6%	18.1%	18.9%	-5.8%

Energy

Brent Crude

CAGR	Entry days																	
19.7%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						1.4%	1.7%	1.8%	1.7%	1.5%	1.6%	1.6%	1.4%	1.3%	1.2%	0.8%	0.2%	0.0%
3						23.8%	23.6%	22.9%	21.2%	20.6%	19.0%	18.8%	18.5%	17.6%	17.3%	16.9%	13.6%	7.3%
5						17.8%	17.7%	17.0%	14.2%	13.7%	12.2%	12.1%	11.7%	10.6%	7.3%	7.4%	0.5%	
10						19.7%	19.2%	18.8%	13.6%	11.0%	10.2%	10.2%	7.5%	7.5%	6.7%	7.1%	4.9%	-1.9%
15						16.9%	14.8%	15.6%	10.4%	7.6%	7.5%	7.0%	6.3%	6.4%	5.8%	5.9%		
20	29.2%					26.4%	23.2%	25.3%	16.3%	15.9%	15.9%	13.1%	13.1%	13.1%	12.8%	13.1%	12.9%	
25	28.9%						16.0%	16.8%	15.0%	14.9%	15.1%	11.2%	11.1%	11.2%	11.1%	11.5%	11.2%	
30	28.9%							14.9%	13.7%	13.5%	13.7%	10.2%	10.3%	10.3%	10.3%	10.5%		
35	28.1%								16.1%	15.6%		8.1%	8.9%	10.0%	10.0%	10.2%	10.3%	
40	28.2%									16.3%	13.7%	10.3%	10.3%	10.6%	10.7%	10.9%	10.3%	
45	27.7%										13.7%	10.3%	10.3%	10.8%	11.0%	12.7%	10.6%	7.8%
50	27.4%											10.2%	10.2%	10.3%	10.6%	11.2%	10.3%	7.4%
55	26.9%												8.8%	9.0%	9.3%	9.8%	8.9%	5.9%
60	26.8%													8.8%	9.1%	9.5%	8.7%	5.7%
65	26.4%														8.2%	8.5%	5.8%	3.9%
70	26.0%															11.0%	8.1%	6.4%
100	23.6%												2.7%				4.7%	4.6%
200	21.0%										4.7%	4.6%	2.7%				0.8%	-9.1%

Exit days

Gasoline

CAGR	Entry days																	
38.5%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						3.8%	3.4%	3.4%	3.0%	3.0%	2.5%	2.6%	3.0%	2.6%	2.7%	2.3%	2.0%	-0.3%
3						37.6%	35.8%	33.4%	29.3%	27.1%	25.4%	25.3%	24.7%	23.2%	23.7%	18.2%	13.0%	5.6%
5						30.0%	27.4%	24.6%	20.4%	15.7%	13.4%	15.6%	13.1%	10.1%	10.7%	7.6%	8.9%	2.5%
10						38.5%	33.8%	34.5%	32.7%	30.9%	23.8%	23.3%	23.5%	15.2%	15.9%	15.1%	18.0%	7.9%
15						51.0%	50.3%	51.6%	50.5%	50.1%	48.9%	49.5%	49.5%	48.5%	48.9%	34.6%	35.9%	16.4%
20	52.7%					50.6%	50.0%	51.1%	50.5%	50.0%	48.8%	49.3%	49.4%	48.3%	48.6%	34.3%	35.8%	15.7%
25	52.8%					35.6%	49.6%	49.9%	49.2%	48.7%	48.2%	48.7%	48.8%	47.5%	47.9%	33.6%	34.9%	15.1%
30	51.9%							46.2%	46.0%	45.4%	45.9%	46.4%	46.5%	45.0%	45.4%	29.0%	32.4%	12.0%
35	37.5%								44.5%	44.1%	44.6%	45.0%	45.0%	42.7%	44.4%	28.9%	32.2%	11.8%
40	36.6%								41.3%	41.5%	40.2%	40.5%	40.4%	37.7%	39.8%	27.5%	30.9%	10.9%
45	35.3%										37.7%	37.9%	38.1%	37.6%	38.1%	24.5%	26.0%	8.3%
50	35.9%										33.4%	37.7%	37.9%	37.3%	37.8%	23.9%	25.5%	7.7%
55	35.4%											-5.5%	36.8%	31.8%	35.9%	22.9%	24.6%	7.3%
60	35.4%					39.7%	39.6%							27.8%	28.3%	20.9%	22.4%	5.0%
65	34.5%					39.7%	39.6%					-0.7%			27.7%	20.2%	21.7%	4.6%
70	33.3%					39.7%	39.6%				0.0%	-0.7%				19.1%	20.5%	3.5%
100	30.2%					54.0%	53.9%				0.0%	-0.2%					17.9%	2.6%
200	19.6%					28.0%	28.2%			0.0%	0.0%	-0.2%	0.0%	-0.1%	0.0%	-2.2%	-1.1%	-4.9%

Exit days

Heating Oil

CAGR	Entry days																	
7.2%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						2.5%	2.8%	2.2%	2.6%	1.8%	1.5%	1.2%	1.2%	0.8%	0.6%	0.7%	0.7%	0.8%
3						22.0%	19.5%	19.5%	18.1%	13.7%	13.3%	13.2%	13.2%	12.3%	12.7%	12.6%	12.2%	6.3%
5						11.7%	9.4%	8.7%	6.7%	4.9%	3.8%	3.5%	3.4%	2.3%	2.9%	2.4%	4.5%	4.9%
10	42.7%					7.2%	9.3%	11.3%	10.4%	5.7%	5.4%	5.2%	5.1%	4.7%	5.1%	5.1%	5.8%	8.8%
15	40.4%					5.6%	9.4%	13.0%	5.4%	4.4%	4.4%	2.7%	2.7%	1.6%	2.3%	2.2%	4.7%	6.8%
20	42.4%					20.3%	22.1%	23.8%	18.8%	18.6%	19.1%	18.9%	19.0%	12.7%	14.5%	14.4%	15.5%	16.8%
25	40.5%						18.3%	19.9%	16.0%	16.4%	16.9%	16.8%	16.8%	10.3%	12.3%	12.2%	13.0%	14.4%
30	40.5%							20.7%	16.8%	17.3%	17.7%	17.6%	17.7%	12.4%	13.0%	12.9%	13.6%	23.2%
35	41.7%								16.0%	16.3%	16.8%	17.0%	17.1%	12.0%	12.6%	12.5%	13.1%	22.3%
40	40.5%									16.8%	17.2%	17.4%	17.5%	12.4%	12.8%	12.8%	13.3%	22.7%
45	41.3%									24.6%	17.0%	17.2%	17.2%	12.1%	12.7%	12.6%	13.2%	22.3%
50	32.4%									-8.2%		16.6%	16.9%	10.3%	12.3%	12.3%	13.0%	21.8%
55	31.1%									-13.2%			7.2%	7.5%	8.3%	8.3%	9.6%	19.2%
60	30.1%									-13.2%				6.4%	7.3%	7.0%	8.3%	18.0%
65	28.8%														5.9%	5.9%	7.0%	15.3%
70	28.8%															6.0%	7.0%	15.2%
100	25.7%										-4.3%	-4.1%	-4.1%				3.3%	14.2%
200	12.2%										-4.3%	-4.1%	-4.1%	-3.9%	-3.3%	-3.3%	-6.4%	3.8%

Exit days

Natural Gas

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
41.7%																		
1					5.0%	5.1%	1.3%	-1.1%	-0.4%	-0.8%	-1.1%	-1.0%	-0.7%	-1.1%	-1.4%	-3.0%	-3.0%	-1.6%
3					48.7%	41.9%	35.0%	35.0%	33.6%	30.1%	28.9%	26.7%	26.6%	23.4%	22.6%	18.1%	10.9%	6.2%
5					46.3%	39.0%	23.9%	28.6%	25.2%	23.4%	22.2%	21.2%	20.9%	19.5%	19.7%	16.9%	5.4%	8.1%
10	34.8%				47.9%	41.7%	34.1%	36.8%	34.7%	33.5%	30.0%	29.6%	29.8%	29.1%	28.3%	26.4%	17.1%	12.6%
15	33.0%				53.9%	54.1%	38.4%	39.9%	38.4%	38.0%	35.3%	35.5%	39.9%	38.6%	37.7%	34.8%	25.7%	15.2%
20	28.3%					64.2%	57.5%	58.9%	56.3%	55.5%	54.2%	53.9%	53.9%	53.2%	53.2%	50.6%	33.4%	24.2%
25	27.2%					72.8%	40.8%	44.5%	43.1%	42.8%	42.4%	43.0%	49.1%	48.3%	48.6%	45.8%	27.7%	22.4%
30	27.3%					84.8%		42.6%	39.4%	39.8%	40.2%	38.4%	40.1%	44.6%	45.4%	43.5%	25.5%	20.5%
35	27.3%					21.3%			38.5%	38.7%	37.1%	36.2%	37.1%	35.7%	33.6%	30.7%	23.6%	20.5%
40	25.0%					48.7%				36.6%	33.9%	32.5%	32.7%	30.9%	28.5%	28.6%	22.1%	19.0%
45						48.7%				41.5%	32.9%	31.3%	31.5%	29.6%	28.5%	28.6%	22.1%	19.0%
50						46.0%						30.8%	30.7%	27.9%	28.1%	28.3%	21.3%	19.0%
55						46.0%							27.6%	27.4%	27.8%	27.8%	20.9%	19.0%
60						46.0%							45.6%	27.4%	27.6%	27.6%	20.9%	19.0%
65						46.0%							50.6%	50.5%	24.4%	25.1%	20.9%	19.0%
70						46.0%										22.6%	18.3%	15.8%
100																	8.5%	12.1%
200																		-5.3%

WTIA Crude Oil

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
21.3%																		
1						1.2%	2.0%	-1.6%	-1.0%	-1.9%	-3.1%	-1.6%	-1.5%	-1.8%	-2.4%	-2.7%	-1.7%	-1.2%
3						27.1%	23.0%	18.2%	18.4%	17.9%	17.9%	18.0%	18.3%	17.1%	14.8%	15.1%	15.1%	14.7%
5						14.9%	11.0%	-0.3%	4.2%	6.8%	8.1%	8.5%	8.9%	6.0%	6.9%	7.5%	1.6%	0.9%
10	53.3%						19.6%		18.6%	16.7%		17.0%	17.8%	18.3%	19.1%	20.0%	16.6%	18.3%
15	58.5%									10.0%				12.1%	13.2%	14.3%	10.7%	12.1%
20	55.8%									25.0%	25.2%	26.0%	26.4%	26.3%	27.0%	27.8%	26.1%	29.3%
25	62.4%									23.7%	24.5%	24.9%	25.4%	25.7%	26.0%	27.0%	24.7%	28.1%
30	56.0%										14.7%	16.2%	16.8%	17.4%	17.7%	18.5%	19.6%	22.4%
35	40.5%										14.7%	16.2%	16.8%	17.4%	17.7%	18.5%	19.6%	22.4%
40	44.4%							22.5%					16.6%	17.0%	17.5%	18.3%	19.2%	22.4%
45	41.6%												15.7%	16.2%	17.4%	18.2%	18.8%	21.7%
50	45.5%							17.8%	20.2%	20.8%			14.4%	14.6%	15.7%	16.5%	18.0%	20.9%
55	36.9%							17.8%	20.2%	20.8%			13.5%	13.5%	14.4%	15.0%	16.5%	19.4%
60	36.8%							17.8%	20.2%	20.8%				13.9%	14.4%	15.1%	16.5%	19.4%
65	35.1%							17.8%	20.2%	20.8%					12.6%	13.4%	14.2%	17.2%
70	34.9%							37.7%	35.2%	35.7%					37.6%	12.5%	13.1%	16.3%
100	36.1%							21.8%	35.2%	35.7%			-67.9%	-35.2%	-33.6%		13.3%	15.2%
200	28.3%							-4.1%	-2.7%				-67.9%	-35.2%	-33.6%	-33.9%	-22.1%	-33.3%

Equity Indices

African Banks

CAGR	Entry days																	
20.9%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						2.2%	1.7%	0.8%	0.9%	-0.1%	0.4%	0.8%	0.4%	0.4%	0.6%	0.6%	0.7%	0.5%
3						29.3%	26.8%	26.0%	24.8%	24.0%	24.5%	24.5%	23.1%	23.2%	23.6%	23.8%	21.5%	20.9%
5						19.1%	13.3%	13.2%	11.5%	9.3%	8.7%	11.4%	10.6%	11.5%	12.6%	13.3%	12.6%	15.3%
10						20.9%	18.0%	17.5%	13.6%	16.3%	14.3%	16.7%	16.0%	17.0%	17.9%	18.4%	18.8%	19.1%
15						21.7%	19.7%	17.9%	11.3%	13.8%	11.7%	13.4%	12.5%	13.4%	14.2%	15.5%	14.6%	17.1%
20	31.9%					23.4%	22.2%	21.3%	10.9%	13.3%	10.9%	14.9%	13.1%	14.3%	15.3%	16.0%	13.1%	15.0%
25	30.7%						20.5%	18.7%	9.6%	11.4%	9.1%	11.0%	9.7%	12.1%	13.0%	14.3%	10.1%	12.3%
30	30.7%							23.9%	15.4%	17.4%	17.6%	19.9%	18.2%	19.1%	19.4%	23.0%	18.6%	12.1%
35	30.5%								16.1%	19.9%	19.5%	22.5%	20.1%	22.1%	22.6%	23.4%	21.9%	14.7%
40	28.4%									17.9%	17.9%	19.6%	18.7%	20.0%	21.0%	22.9%	19.6%	11.9%
45	28.4%										24.0%	25.6%	19.6%	21.0%	21.6%	22.5%	20.7%	13.7%
50	27.9%											25.2%	20.3%	21.1%	21.7%	22.3%	20.9%	15.1%
55	28.2%												20.0%	20.7%	21.3%	22.1%	20.7%	14.5%
60	28.4%													20.6%	21.2%	22.0%	20.5%	14.2%
65	27.8%														21.0%	21.8%	19.9%	13.7%
70	28.3%						46.9%					21.8%				22.0%	20.9%	16.6%
100	5.9%						46.9%					13.3%					22.4%	15.4%
200	5.6%						46.9%					-3.8%	-3.5%				18.8%	18.9%

Exit days

ALSI

CAGR	Entry days																	
45.5%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						9.9%	8.7%	7.8%	6.7%	6.9%	7.7%	7.2%	6.1%	6.8%	6.4%	6.0%	6.5%	6.5%
3						42.5%	38.3%	35.1%	32.3%	31.7%	31.6%	26.8%	25.9%	25.7%	25.9%	25.0%	22.4%	22.7%
5						45.6%	42.2%	40.9%	38.4%	27.5%	25.9%	24.9%	24.0%	25.2%	25.9%	24.9%	21.5%	25.0%
10						45.5%	35.7%	34.2%	31.3%	21.3%	21.1%	21.6%	21.8%	22.1%	23.0%	22.2%	22.5%	26.6%
15						35.8%	32.2%	31.0%	27.8%	16.3%	15.0%	15.8%	17.0%	17.4%	19.0%	19.1%	18.5%	21.6%
20	73.7%					42.7%	40.2%	38.6%	33.5%	27.7%	26.8%	26.9%	27.1%	28.0%	30.2%	34.8%	30.9%	31.4%
25	73.6%						46.4%	46.9%	43.6%	43.0%	43.4%	44.1%	44.8%	45.6%	46.5%	46.3%	40.2%	41.8%
30	73.0%							46.1%	42.7%	35.7%	35.7%	43.1%	43.5%	44.3%	45.2%	45.3%	37.6%	40.9%
35	72.4%								48.5%	43.4%	42.7%	48.9%	49.4%	50.0%	50.8%	50.3%	42.4%	44.7%
40	72.7%									50.2%	48.9%	54.8%	55.3%	55.8%	56.4%	55.7%	47.5%	49.8%
45	71.6%										48.9%	54.9%	55.3%	55.8%	56.4%	55.7%	47.4%	49.8%
50	71.8%											49.3%	49.6%	55.6%	56.3%	55.5%	44.9%	44.7%
55	70.4%												42.7%	43.2%	44.2%	54.3%	36.2%	38.9%
60	69.3%													42.6%	43.6%	49.8%	35.9%	38.6%
65	68.9%														43.3%	49.3%	35.7%	38.3%
70	63.7%									58.5%	58.5%					44.2%	35.7%	38.4%
100	52.8%									-5.5%							30.7%	31.3%
200	29.5%									-5.5%								31.3%

Exit days

Capped Top40

CAGR	Entry days																	
11.9%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
1						5.5%	5.1%	4.2%	3.6%	3.8%	4.0%	4.3%	3.8%	4.2%	3.8%	3.5%	3.1%	2.5%
3						27.3%	27.0%	24.7%	18.9%	19.1%	21.2%	19.0%	17.8%	16.9%	16.9%	14.7%	13.7%	14.1%
5	70.8%					19.3%	18.3%	18.3%	17.5%	13.0%	17.4%	14.0%	12.4%	13.1%	14.1%	12.4%	11.3%	13.0%
10	70.8%					11.9%	11.2%	10.4%	4.5%	7.0%	11.1%	10.1%	8.3%	10.3%	11.3%	10.0%	6.9%	7.9%
15	67.4%					7.8%	7.7%	4.7%	-2.2%	1.3%	1.6%	2.4%	-3.5%	0.2%	2.8%	-0.8%	3.8%	7.0%
20	66.3%					21.6%	26.3%	26.4%	23.4%	20.6%	23.5%	23.5%	21.5%	23.2%	24.0%	22.9%	24.4%	15.8%
25	66.9%						28.7%	27.9%	26.9%	27.7%	36.0%	36.2%	29.7%	35.1%	37.3%	27.2%	29.0%	19.8%
30	64.9%							34.2%	27.2%	29.6%	33.7%	32.1%	27.8%	29.0%	33.7%	23.6%	27.0%	15.5%
35	64.4%								35.1%	35.6%	39.4%	38.5%	35.6%	37.0%	38.4%	28.8%	31.7%	20.5%
40	65.5%									47.4%	48.3%	48.5%	46.4%	47.8%	48.5%	36.1%	38.4%	28.8%
45	61.1%										48.0%	48.2%	44.2%	45.1%	47.5%	35.4%	38.1%	28.8%
50	61.3%										50.8%	48.4%	44.4%	45.1%	47.5%	35.4%	38.1%	28.8%
55	60.3%										49.3%		44.3%	45.1%	47.5%	35.3%	38.0%	28.8%
60	58.6%										43.1%			44.3%	44.9%	34.6%	37.0%	28.4%
65	47.4%														37.9%	29.4%	31.5%	27.8%
70	45.5%														54.0%	27.8%	30.1%	25.9%
100	24.0%																23.6%	21.5%
200	23.4%																	20.8%

Exit days

DiviPlus

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
2.4%																		
1						0.5%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.4%	0.3%	0.2%	0.2%
3						4.2%	3.6%	3.0%	3.0%	2.7%	2.5%	2.4%	2.4%	2.4%	2.4%	2.1%	1.7%	1.5%
5	9.7%					4.4%	4.3%	4.0%	4.1%	3.5%	3.1%	3.1%	3.2%	3.2%	3.2%	3.1%	2.1%	1.9%
10	8.9%	5.9%				2.4%	2.1%	1.8%	1.9%	1.4%	1.2%	1.4%	1.5%	1.6%	1.5%	1.5%	1.2%	1.0%
15	8.2%	10.6%				0.7%	1.2%	1.0%	1.1%	0.4%	0.4%	0.6%	0.8%	0.9%	0.9%	0.9%	0.8%	0.7%
20	6.5%	3.4%				1.0%	1.6%	1.7%	1.7%	1.0%	1.1%	1.3%	1.4%	1.6%	1.6%	1.5%	1.4%	1.7%
25	6.9%	4.2%				-3.6%	0.9%	0.9%	0.8%	0.8%	0.8%	1.0%	1.2%	1.3%	1.3%	1.2%	1.8%	2.0%
30	6.6%						3.8%	0.6%	0.6%	0.5%	0.6%	0.8%	0.9%	1.1%	1.0%	1.0%	1.5%	1.7%
35	6.6%					3.0%	10.0%	-7.1%	0.9%	0.9%	0.9%	1.1%	1.2%	1.4%	1.4%	1.3%	1.9%	2.2%
40	5.6%					1.6%		-55.1%	-18.6%	0.8%	0.8%	1.0%	1.1%	1.3%	1.3%	1.2%	1.8%	2.1%
45	5.4%					1.6%	-0.1%	1.2%	-15.7%	-14.8%	0.6%	0.8%	0.9%	1.1%	1.1%	0.9%	1.6%	1.9%
50	5.3%					1.6%	-0.1%	-10.0%			-1.3%	0.7%	0.8%	1.0%	1.0%	0.9%	1.6%	1.9%
55	5.2%					-1.2%	-0.1%	-10.0%			-1.3%	0.5%	0.7%	0.8%	0.8%	0.9%	1.6%	1.9%
60	5.1%					8.0%	-0.1%	2.0%	2.1%	2.6%	0.1%	1.8%	-10.2%	2.0%	2.1%	2.2%	2.9%	3.1%
65	4.9%	-22.1%				8.0%	-0.1%	2.0%	2.1%	2.0%	-0.5%	-0.5%		1.3%	1.9%	2.0%	2.7%	2.9%
70	4.8%	-22.1%				8.0%	-0.1%	2.0%	2.1%	2.0%	2.0%	2.0%	-14.4%	1.3%	-15.7%	1.9%	2.6%	2.8%
100	4.0%	-50.7%				-13.4%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-14.4%	0.0%	-15.7%	-15.4%	2.2%	2.5%
200	3.9%	-46.9%				-13.4%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-1.3%	-1.2%	1.9%	2.0%

FIN15

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
16.1%																		
1						2.5%	1.9%	2.5%	2.3%	1.9%	1.2%	1.1%	1.3%	1.0%	1.0%	0.9%	1.4%	1.8%
3						38.1%	37.8%	36.8%	36.4%	36.4%	34.8%	33.6%	33.9%	33.9%	34.1%	32.1%	32.7%	31.9%
5						25.0%	26.0%	24.0%	23.9%	23.6%	23.2%	21.7%	22.5%	22.7%	23.8%	23.1%	24.6%	24.5%
10						16.1%	20.5%	19.1%	18.6%	20.1%	10.4%	14.6%	18.6%	20.5%	21.4%	17.0%	22.8%	22.0%
15						18.6%	20.1%	21.6%	20.5%	22.3%	11.1%	18.0%	19.3%	21.0%	21.9%	17.5%	24.9%	20.1%
20	46.0%					18.3%	20.1%	20.9%	19.9%	21.7%	10.7%	15.2%	19.9%	21.7%	23.1%	19.7%	23.9%	21.4%
25	44.8%						21.7%	21.9%	21.0%	22.8%	11.4%	20.8%	21.1%	22.9%	23.8%	19.5%	24.4%	20.0%
30	44.8%							24.8%	24.4%	25.6%	22.5%	27.0%	27.2%	28.9%	29.6%	27.8%	30.2%	18.9%
35	45.9%								27.5%	28.1%	23.7%	28.8%	29.4%	30.5%	31.1%	30.9%	33.1%	19.5%
40	46.0%									29.3%	25.1%	28.2%	30.4%	31.6%	32.1%	31.8%	33.6%	19.1%
45	44.5%										23.6%	28.6%	29.6%	30.6%	31.3%	30.8%	32.9%	14.0%
50	43.4%										28.2%	24.4%	26.5%	29.1%	30.0%	27.2%	31.8%	11.7%
55	43.2%												24.4%	27.0%	27.8%	25.9%	31.2%	11.2%
60	42.1%													28.0%	28.8%	25.2%	30.5%	12.4%
65	39.1%										-0.2%	20.2%	24.4%	29.2%	28.5%	25.1%	30.3%	11.6%
70	38.5%							30.4%	51.5%		-1.4%	16.7%	16.8%	20.9%		24.7%	31.0%	13.4%
100	29.0%							30.4%	51.5%	19.5%	-1.2%	20.8%	26.1%	-3.6%			24.1%	6.7%
200	12.8%						50.5%	51.4%	51.5%	19.5%	-1.2%	-0.5%	-0.2%	22.2%				13.4%

FINDI30

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
39.6%																		
1						3.7%	4.9%	4.0%	4.9%	4.4%	3.6%	4.3%	4.2%	5.6%	5.9%	5.9%	4.7%	5.3%
3						54.2%	52.3%	49.0%	49.6%	48.8%	47.4%	43.3%	43.3%	41.2%	41.5%	40.6%	36.0%	33.1%
5						45.6%	47.8%	46.3%	47.1%	46.4%	46.9%	47.2%	45.2%	41.7%	42.0%	40.8%	37.0%	35.5%
10						39.6%	40.8%	39.6%	34.2%	32.5%	33.8%	34.0%	30.6%	26.6%	27.6%	27.6%	28.0%	25.7%
15						43.1%	44.8%	43.3%	43.9%	43.7%	35.8%	36.3%	35.5%	31.4%	31.9%	32.0%	36.0%	27.3%
20	70.0%					37.3%	43.1%	45.0%	45.9%	46.1%	38.3%	39.7%	38.2%	38.1%	38.5%	38.7%	43.6%	34.1%
25	68.7%						47.0%	45.8%	47.8%	48.0%	40.4%	40.8%	40.4%	40.3%	40.8%	41.0%	42.9%	34.9%
30	67.9%							47.7%	48.4%	48.8%	38.7%	39.1%	38.6%	38.8%	39.4%	39.5%	42.3%	34.8%
35	67.0%								49.6%	49.0%	42.3%	42.7%	42.3%	42.4%	42.9%	43.1%	48.8%	41.2%
40	65.8%									47.6%	40.1%	41.8%	39.7%	40.2%	40.7%	41.5%	48.0%	40.2%
45	64.7%										37.6%	38.2%	36.1%	37.0%	38.5%	38.6%	42.2%	38.0%
50	64.6%											38.0%	35.9%	36.4%	37.2%	37.4%	41.8%	31.7%
55	62.9%											71.0%	27.7%	28.0%	28.4%	28.4%	30.4%	23.1%
60	61.8%													27.3%	28.1%	28.2%	29.4%	22.5%
65	50.5%														29.6%	29.7%	36.0%	29.2%
70	50.2%															39.5%	46.3%	35.5%
100	35.2%																43.6%	32.9%
200																		31.4%

General Retailers

CAGR	Entry days																		
Exit days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
38.4%																			
1						7.0%	6.7%	6.4%	6.3%	6.1%	6.2%	6.2%	5.8%	6.1%	6.1%	6.0%	5.6%	4.2%
3						37.9%	37.5%	37.5%	36.6%	36.2%	36.1%	35.5%	34.9%	35.0%	34.8%	33.8%	32.6%	30.1%
5						38.0%	37.6%	37.7%	36.7%	35.9%	36.4%	34.8%	34.0%	34.1%	34.1%	33.2%	32.1%	29.9%
10						38.4%	38.1%	38.3%	37.8%	36.3%	37.4%	35.0%	34.5%	34.6%	35.0%	34.2%	33.7%	31.2%
15	43.9%					37.3%	37.0%	37.2%	36.6%	35.5%	36.4%	34.4%	33.9%	34.0%	34.3%	34.0%	33.4%	31.2%
20	43.2%					38.7%	38.4%	38.5%	38.1%	37.3%	38.0%	36.4%	36.4%	36.5%	36.7%	36.5%	36.0%	33.3%
25	41.1%						38.8%	39.0%	38.6%	38.0%	38.6%	37.2%	36.4%	36.5%	36.7%	36.4%	36.0%	33.3%
30	41.2%							39.2%	39.1%	38.4%	39.0%	38.0%	36.2%	36.3%	36.5%	36.2%	35.8%	33.0%
35	40.4%								37.1%	37.2%	37.9%	36.9%	35.1%	35.2%	35.4%	35.1%	34.6%	31.9%
40	40.4%									37.2%	37.4%	36.9%	35.0%	35.1%	35.3%	35.1%	34.6%	31.6%
45	40.7%										37.4%	37.0%	35.2%	35.3%	35.5%	35.2%	34.7%	31.8%
50	40.2%											36.3%	34.5%	34.6%	34.8%	34.5%	34.0%	31.1%
55	38.9%												35.4%	35.5%	35.7%	35.4%	34.9%	32.2%
60	37.9%										10.5%			34.8%	35.0%	34.8%	34.2%	31.4%
65	38.2%										15.6%				35.8%	35.6%	35.0%	32.4%
70	35.0%										15.6%					36.3%	35.7%	33.2%
100	21.3%															0.0%	29.5%	26.4%
200	5.7%															0.0%	18.8%	24.2%

GLDX

CAGR	Entry days																		
Exit days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
5.5%																			
1						2.0%	1.7%	1.5%	1.4%	0.2%	0.0%	-0.3%	-0.2%	-0.2%	-0.3%	-0.2%	-0.5%	-0.1%
3						31.3%	28.3%	24.3%	23.5%	20.9%	23.2%	17.0%	17.2%	15.6%	15.1%	15.8%	11.8%	7.5%
5						21.6%	14.7%	4.0%	4.3%	4.5%	4.3%	-0.7%	-0.4%	0.6%	1.4%	3.4%	-2.8%	-1.0%
10	35.1%	45.3%				5.5%	-0.2%	-11.4%	-6.1%	-1.7%	-0.3%	-12.5%	-14.8%	-10.1%	-8.1%	-6.2%	-10.5%	-8.5%
15	30.7%					2.3%	-25.7%		-21.5%	-8.7%	-7.7%			-26.3%	-19.3%	-14.8%	-14.4%	-10.0%
20	25.9%					0.9%					-13.7%					-27.9%	-22.6%	-14.7%
25	24.5%										-14.5%					-47.3%	-32.3%	-14.7%
30	23.5%							-1.5%	1.7%	3.5%	4.7%	-49.8%	-26.3%	-15.8%	-12.7%	-10.2%	-12.9%	-6.8%
35	17.8%								0.3%	2.3%	3.3%	-49.8%	-26.3%	-15.8%	-12.7%	-10.2%	-12.9%	-6.8%
40	12.0%								2.5%	-0.2%	-0.8%		-37.3%	-18.8%	-14.9%	-11.4%	-12.9%	-6.8%
45	4.6%						22.8%	-5.8%	-2.5%	-1.3%	-3.6%			-28.5%	-20.2%	-15.1%	-15.8%	-8.5%
50	8.4%					23.3%	22.8%	-5.8%	-2.5%	-1.3%	22.2%				-32.5%	-21.7%	-19.9%	-10.2%
55	8.3%					23.3%	22.8%	-5.8%	-2.5%	-1.3%	3.5%	-2.1%			-39.4%	-23.3%	-23.0%	-11.5%
60	3.8%					18.2%	22.8%	-5.8%	-2.5%	-1.3%	25.6%	-2.1%			-39.4%	-23.3%	-23.0%	-11.5%
65	3.1%					18.2%	22.8%	-5.8%	-2.5%	-1.3%	25.6%	-2.1%			-39.4%	-23.3%	-23.0%	-11.5%
70	9.8%						22.8%	-5.8%	-2.5%	-1.3%	25.6%	20.8%	-2.1%	-1.2%	-0.9%		-23.0%	-11.5%
100	4.8%	31.7%					22.8%	-3.5%	-1.3%	1.5%	16.7%	0.3%	-3.4%	-1.7%	-1.0%	-0.5%		-14.7%
200	8.2%						22.8%	-1.6%	0.4%	1.5%	5.2%	4.6%	-1.9%	-1.8%	-1.7%	-1.7%	5.2%	-14.7%

INDI25

CAGR	Entry days																		
Exit days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
44.1%																			
1						9.1%	6.7%	5.4%	5.2%	4.6%	5.2%	5.1%	5.2%	5.4%	6.0%	5.6%	6.0%	6.3%
3						53.1%	51.0%	48.3%	49.0%	48.1%	47.9%	45.0%	45.1%	45.0%	44.8%	44.8%	39.4%	37.6%
5						47.4%	47.4%	44.6%	45.5%	44.5%	44.3%	39.6%	38.7%	37.7%	38.4%	38.6%	35.3%	33.5%
10						44.1%	45.5%	44.7%	41.0%	39.6%	38.4%	32.9%	31.0%	31.3%	31.6%	31.7%	30.1%	28.8%
15						46.8%	47.9%	46.1%	43.6%	40.7%	41.0%	37.5%	32.9%	33.1%	33.5%	33.8%	35.3%	28.8%
20	69.6%					42.8%	44.8%	44.2%	41.2%	40.6%	41.0%	33.2%	31.9%	32.2%	32.5%	32.6%	34.0%	28.0%
25	69.0%						47.9%	47.6%	40.4%	39.2%	39.4%	38.0%	32.1%	36.0%	37.2%	38.0%	39.3%	28.4%
30	67.9%							41.5%	42.5%	41.5%	42.0%	36.4%	29.9%	30.1%	30.5%	30.8%	38.8%	28.0%
35	65.8%								40.1%	39.0%	38.6%	28.1%	25.7%	26.0%	26.1%	26.3%	34.1%	22.6%
40	66.1%									42.6%	39.9%	32.9%	31.8%	32.8%	33.1%	33.3%	37.1%	28.6%
45	65.5%										40.0%	33.2%	32.0%	33.0%	33.2%	33.5%	35.4%	28.8%
50	65.1%										42.6%	32.0%	32.0%	32.9%	33.2%	33.4%	34.8%	28.7%
55	64.2%												32.2%	33.0%	33.2%	33.4%	29.1%	28.6%
60	63.5%													33.8%	33.9%	34.1%	29.3%	26.8%
65	60.3%														44.4%	44.6%	45.1%	38.8%
70	60.1%														44.4%	44.6%	45.1%	38.8%
100	44.2%																51.8%	39.5%
200	-16.3%																	26.6%

MidCap60

CAGR																			
	Entry days																		
75.0%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
Exit days 1						13.9%	13.5%	12.7%	13.4%	13.0%	12.6%	12.1%	12.4%	12.6%	11.8%	11.6%	11.4%	10.7%
3						77.1%	75.4%	74.4%	74.3%	74.3%	73.5%	72.3%	72.3%	71.1%	70.7%	70.1%	68.1%	65.2%
5						77.2%	75.2%	74.6%	74.5%	74.5%	73.3%	71.7%	71.9%	70.4%	70.0%	69.7%	68.2%	64.9%
10						75.0%	73.5%	72.8%	72.7%	73.3%	71.2%	70.0%	69.9%	69.2%	69.2%	69.3%	68.7%	65.4%
15						76.4%	75.5%	74.9%	74.7%	75.4%	73.5%	72.3%	71.7%	71.0%	71.1%	71.1%	70.6%	67.8%
20	82.5%					74.4%	73.9%	73.8%	73.5%	74.1%	72.4%	71.7%	71.2%	70.9%	70.6%	70.6%	69.8%	66.9%
25	80.9%						72.6%	72.6%	71.9%	72.5%	70.7%	70.7%	70.2%	69.9%	69.5%	69.6%	68.8%	66.2%
30	80.3%							72.5%	71.6%	72.2%	70.5%	70.5%	70.0%	69.7%	69.6%	69.7%	68.5%	67.2%
35	79.9%								72.8%	72.8%	72.3%	72.2%	71.8%	71.6%	71.6%	71.7%	67.7%	66.5%
40	80.2%									71.7%	71.8%	71.7%	71.2%	71.1%	71.1%	71.1%	67.3%	66.1%
45	79.5%										71.1%	71.0%	70.5%	70.4%	70.3%	70.4%	66.5%	65.3%
50	79.0%											71.5%	70.9%	70.6%	70.7%	70.8%	67.8%	66.6%
55	78.7%												70.7%	70.3%	70.4%	70.5%	67.4%	66.3%
60	78.5%								71.0%	71.0%				72.4%	72.5%	72.6%	69.8%	68.8%
65	78.0%								71.0%	71.0%				77.9%	71.9%	71.9%	69.3%	68.3%
70	77.9%								71.0%	71.0%				63.8%		71.9%	69.3%	68.3%
100	71.8%								28.7%	28.7%				-0.3%			66.3%	63.5%
200	8.8%								28.7%	28.7%				-0.3%				38.5%

RESI10

CAGR																			
	Entry days																		
40.7%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
Exit days 1						18.7%	15.9%	17.3%	18.6%	18.5%	15.6%	15.8%	15.9%	14.8%	15.3%	14.5%	14.4%	12.9%
3						57.1%	50.8%	47.9%	47.3%	46.9%	44.7%	41.0%	40.4%	40.3%	38.7%	39.1%	35.3%	31.9%
5						49.0%	40.5%	35.1%	34.4%	29.4%	30.2%	29.3%	30.6%	30.4%	27.6%	28.8%	23.6%	27.9%
10						40.7%	36.0%	32.8%	32.4%									
15						41.0%	28.6%	27.1%										
20	82.5%					41.1%	40.9%	40.0%	39.5%	37.6%								
25	75.9%						45.3%	44.7%	44.6%									
30	79.9%							44.8%	44.3%	43.4%								
35	79.8%									43.6%								
40	81.7%																	
45	78.5%																	
50	80.9%																	
55	79.4%																	
60	77.4%																	
65	70.0%																	
70	69.5%																	
100	54.6%																	
200	53.9%																	

SA Property

CAGR																			
	Entry days																		
14.3%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
Exit days 1					1.4%	1.0%	0.9%	0.8%	0.7%	0.7%	0.6%	0.5%	0.6%	0.6%	0.6%	0.5%	0.4%	0.2%
3					17.2%	14.8%	13.2%	12.8%	12.2%	11.4%	11.1%	10.4%	10.3%	10.1%	9.8%	9.6%	7.9%	5.5%
5					17.4%	15.2%	13.7%	13.4%	13.0%	12.3%	12.1%	11.2%	11.1%	11.0%	10.8%	10.7%	8.5%	6.2%
10					16.6%	14.3%	13.3%	12.9%	12.8%	12.2%	12.0%	11.1%	11.3%	11.3%	11.0%	11.0%	8.9%	6.4%
15	15.6%				16.0%	14.4%	13.1%	12.5%	12.3%	11.9%	11.8%	11.3%	11.5%	11.5%	11.3%	11.3%	8.9%	6.4%
20	15.9%					13.4%	13.0%	12.3%	12.1%	11.8%	11.8%	10.9%	11.0%	11.1%	10.9%	10.9%	8.8%	6.4%
25	15.4%					21.6%	13.3%	13.2%	13.1%	12.0%	11.9%	11.2%	11.3%	11.4%	10.9%	11.0%	7.7%	5.4%
30	14.9%					16.1%	-18.3%	12.7%	12.5%	12.0%	12.0%	11.2%	11.3%	11.4%	11.4%	11.5%	8.3%	6.2%
35	13.7%					14.9%	5.7%		11.8%	11.2%	11.2%	10.5%	10.7%	10.8%	10.8%	10.9%	7.6%	5.4%
40	13.2%					-9.1%	-9.4%			10.2%	10.1%	9.4%	9.6%	9.7%	9.7%	9.8%	6.3%	4.4%
45	12.9%					11.2%	9.0%	2.9%			9.7%	9.0%	9.2%	9.3%	9.3%	9.4%	6.0%	4.2%
50	12.8%					11.2%	9.0%	2.9%				8.5%	8.7%	8.8%	8.8%	8.9%	5.7%	3.8%
55	12.5%					11.2%	9.0%	2.9%					8.1%	8.2%	8.2%	8.3%	5.2%	3.3%
60	10.7%					11.2%	9.0%	2.9%						8.8%	8.8%	8.9%	6.1%	3.3%
65	10.9%					11.2%	9.0%	2.9%							8.4%	8.5%	5.8%	3.0%
70	10.6%					11.2%	9.0%	2.9%							7.0%	8.4%	5.8%	3.0%
100	9.2%					0.0%	-18.7%	-20.9%					-20.8%	0.0%	0.0%	0.0%	4.6%	1.5%
200	4.5%				-16.9%	0.0%	-18.7%	-20.9%					-20.8%	0.0%	0.0%	0.0%	-24.1%	0.4%

SWIX Top40

CAGR	Entry days																		
Exit days	11.2%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
	1						2.3%	2.9%	1.9%	2.7%	2.5%	2.7%	3.0%	3.0%	3.0%	2.9%	2.4%	2.4%	1.3%
	3						26.3%	24.7%	23.1%	23.2%	22.0%	22.3%	22.4%	21.8%	21.6%	21.0%	18.1%	17.0%	15.3%
	5	52.2%					24.7%	19.6%	19.4%	18.9%	18.6%	17.7%	17.8%	18.2%	20.0%	19.9%	17.5%	17.2%	16.1%
	10	50.3%					11.2%	8.7%	9.8%	9.4%	9.9%	9.6%	9.9%	9.6%	10.5%	11.5%	10.4%	11.7%	11.7%
	15	48.6%					19.4%	12.4%	12.8%	12.6%	16.1%	13.2%	13.7%	13.6%	14.9%	15.7%	14.4%	16.0%	16.2%
	20	49.1%					26.9%	21.8%	22.9%	23.0%	24.9%	23.8%	24.3%	23.4%	24.2%	25.1%	21.5%	23.1%	25.4%
	25	49.1%						33.7%	34.3%	34.1%	35.0%	34.5%	34.7%	34.3%	34.7%	35.2%	24.2%	25.8%	27.2%
	30	48.4%							31.7%	31.6%	32.9%	32.3%	32.5%	32.0%	32.4%	33.1%	20.8%	22.6%	24.3%
	35	47.6%								32.9%	33.2%	33.5%	33.7%	33.2%	33.6%	34.2%	23.1%	25.0%	26.6%
	40	47.9%									38.4%	38.6%	38.7%	38.4%	38.7%	39.1%	31.6%	32.7%	33.8%
	45	46.8%									38.4%	38.2%	38.4%	38.0%	38.1%	38.6%	30.8%	32.0%	33.1%
	50	47.1%											38.6%	38.2%	38.3%	38.8%	31.1%	32.1%	33.2%
	55	46.7%												38.0%	38.1%	38.6%	30.8%	31.9%	33.0%
	60	45.4%													36.6%	37.1%	28.6%	29.8%	30.9%
	65	44.7%														38.2%	30.1%	30.9%	32.1%
	70	42.8%															28.9%	29.7%	31.0%
	100	19.7%																25.6%	26.6%
	200	11.9%																	27.9%

TOP40

CAGR	Entry days																		
Exit days	21.6%	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
	1						8.6%	7.1%	6.2%	6.8%	4.2%	4.1%	4.4%	5.0%	5.6%	4.3%	3.8%	3.9%	5.5%
	3						30.7%	28.6%	25.7%	24.6%	23.0%	21.7%	21.1%	19.9%	20.0%	18.5%	17.6%	16.7%	18.0%
	5						27.6%	26.7%	28.7%	26.7%	23.8%	20.8%	21.1%	20.6%	21.1%	19.6%	19.6%	17.7%	20.1%
	10						21.6%	21.9%	24.7%	20.0%	14.6%	12.1%	13.0%	12.3%	13.8%	11.5%	11.3%	11.6%	12.3%
	15						14.8%	14.5%	17.0%	10.4%	3.9%	-2.2%	1.1%	2.4%	5.5%	0.7%		1.5%	2.9%
	20	70.0%					17.1%	15.9%	19.6%	16.8%	13.7%	12.1%	13.4%	14.0%	15.8%	13.8%	12.0%	14.0%	15.2%
	25	70.2%						29.8%	32.2%	28.9%	28.5%	28.6%	29.0%	28.7%	29.4%	29.5%	18.5%	19.8%	17.3%
	30	70.1%							32.7%	30.1%	30.0%	29.0%	29.8%	30.0%	30.3%	30.3%	28.5%	22.9%	19.5%
	35	70.2%								34.1%	33.7%	30.1%	33.2%	34.0%	34.6%	34.9%	30.4%	30.1%	24.7%
	40	69.9%									35.9%	36.0%	37.9%	37.9%	42.7%	42.4%	41.2%	35.2%	28.1%
	45	67.8%									44.2%	35.6%	35.9%	35.9%	38.3%	37.9%	39.1%	34.9%	27.4%
	50	67.7%											35.6%	35.6%	36.2%	36.6%	31.4%	34.0%	27.0%
	55	66.8%												35.3%	36.1%	36.1%	30.9%	32.4%	26.0%
	60	66.2%													35.5%	35.7%	30.4%	30.8%	24.8%
	65	59.9%														36.3%	31.0%	32.3%	26.4%
	70	58.5%									-5.3%					46.2%	31.4%	32.4%	27.5%
	100	45.2%									-5.3%							28.3%	25.6%
	200	27.9%									-5.3%								24.9%

Precious Metals

Copper

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
38.0%																		
1						-0.9%	-0.1%	-0.2%	-1.0%	-1.2%	-0.9%	-0.2%	0.7%	0.9%	1.2%	0.2%	-1.5%	-1.0%
3						56.0%	50.9%	47.8%	48.0%	42.9%	42.8%	44.2%	43.7%	36.3%	36.2%	31.9%	18.6%	8.8%
5						48.1%	46.7%	43.1%	43.6%	43.6%	43.1%	42.9%	42.5%	41.5%	41.4%	34.5%	13.0%	1.4%
10						38.0%	43.1%	35.6%	39.8%	46.4%	43.2%	42.4%	42.1%	41.4%	41.5%	37.5%	20.3%	17.0%
15	54.8%					31.8%	35.7%	30.1%	33.6%	34.4%	34.8%	32.6%	32.7%	32.6%	32.8%	26.4%	12.6%	10.7%
20	27.4%					61.0%	61.9%	54.4%	58.1%	28.1%	29.3%	29.3%	29.1%	28.7%	29.3%	22.7%	10.0%	7.9%
25	37.7%					9.5%	46.8%	39.1%	43.5%	19.1%	23.6%	24.4%	22.5%	19.9%	20.9%	19.2%	5.0%	4.4%
30	31.8%							53.4%	56.3%	24.9%	25.4%	25.9%	26.2%	26.9%	27.2%	19.5%	1.6%	3.9%
35	32.5%								54.1%	23.9%	24.9%	24.3%	23.3%	21.8%	21.8%	14.5%	1.6%	3.9%
40	32.2%							23.1%		22.1%	23.1%	22.9%	23.2%	17.8%	18.7%	11.2%	-10.0%	0.5%
45	36.3%							23.1%	22.9%		23.2%	23.3%	23.7%	24.1%	21.8%	13.8%	-9.3%	0.5%
50	34.6%							77.7%	94.1%		68.1%	20.9%	21.4%	21.1%	18.2%	10.4%	-32.6%	-7.1%
55	31.3%								77.7%		22.4%	8.8%	19.7%	14.8%	15.8%	8.3%		-7.1%
60	33.2%													11.4%	11.5%	4.1%		-13.7%
65	33.2%													29.1%	9.6%	2.9%		-13.7%
70	33.4%													29.1%	29.4%	2.9%		-13.7%
100	32.4%													37.9%	37.9%	-2.2%		-28.5%
200	28.9%													-0.1%	0.0%	0.0%	-5.9%	-28.5%

Gold

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
89.8%																		
1						26.2%	24.7%	23.6%	21.1%	17.4%	15.0%	17.2%	15.9%	16.9%			6.7%	12.4%
3						80.0%	79.2%	78.6%	78.3%	74.4%	75.3%	74.4%	72.1%	70.1%	69.5%	70.0%	65.6%	64.6%
5						76.2%	73.9%	71.6%	69.3%	64.0%	64.5%	65.9%	65.6%	63.4%	63.4%	64.5%	57.8%	50.9%
10	148.1%					89.8%	86.3%	81.7%	79.2%	72.1%	73.8%	74.9%	73.7%	73.4%	75.1%	75.9%		
15	158.6%					83.7%	81.8%	80.7%	80.5%	73.1%	74.5%	75.5%	76.4%	76.2%	77.7%	78.7%		
20	151.8%					77.5%					62.8%	64.2%	65.7%	66.7%	68.5%	69.9%		
25	155.8%										71.8%	72.9%	74.1%	74.8%	76.3%	77.4%		
30	154.7%					124.2%	57.3%											
35	152.0%																	
40	146.7%										64.9%	66.3%	67.7%	68.6%	70.4%	71.7%		
45	149.6%												62.0%	62.9%	64.8%	66.4%		
50	149.5%												61.5%	62.3%	64.2%	65.8%		
55	148.4%														62.2%	63.9%		
60	145.3%																	
65	134.2%																	
70	122.4%																	
100	84.3%						39.4%									-41.0%		
200	0.0%																	

Palladium

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
91.2%																		
1												16.9%	16.9%	17.4%	15.4%	17.9%	17.7%	17.7%
3					102.0%	95.2%	94.4%	94.8%	93.0%	87.9%	82.6%	82.5%						66.8%
5																		76.3%
10	139.8%				111.8%	91.2%	95.2%		96.8%	94.7%	93.0%	94.6%						79.9%
15	121.9%									94.9%	93.3%	94.5%						79.6%
20	80.0%									75.1%	75.6%	77.7%						71.8%
25	79.1%									86.7%	87.7%	88.5%						74.2%
30	80.2%									98.6%	99.0%	100.5%						85.7%
35	80.4%										89.5%	94.6%						75.8%
40	80.1%																	74.8%
45	77.8%																	68.8%
50	75.9%																	65.4%
55	76.1%				19.8%													64.2%
60	77.4%				19.8%													63.2%
65	77.5%				19.8%													62.1%
70	72.7%				19.8%													62.1%
100	79.5%				19.8%													74.3%
200										0.0%	0.0%	0.0%						

Platinum

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
132.0%																		
1						29.1%			27.4%	28.3%	28.5%	27.9%	8.4%					23.9%
3						140.7%	139.8%	127.7%	127.7%	126.7%	122.1%	118.6%	103.9%	103.7%	102.1%	101.9%		88.9%
5						123.7%	126.5%	112.2%	113.8%	115.3%	111.5%	110.3%	96.8%	96.6%	98.1%	99.2%		
10	130.4%												98.1%	97.8%	100.0%	99.9%		
15	114.8%												96.9%	96.8%	97.3%	97.1%		
20	102.2%												93.7%			96.2%		
25	106.9%																	
30	104.7%												90.6%	90.6%	92.6%	93.1%		
35	105.6%												90.6%	90.6%	92.6%	93.1%		
40	112.5%												90.8%	90.4%	92.7%	93.1%		
45	100.7%												90.9%	90.8%	92.5%	93.2%		
50	101.2%												90.6%	90.5%	92.5%	93.0%		
55	97.2%												88.9%	87.7%	89.3%	90.8%		
60	93.0%													84.3%	86.2%	87.3%		
65	93.4%														82.2%	83.4%		
70	93.6%												74.7%		118.2%	83.1%		
100	93.7%																	
200	76.3%																	

Silver

CAGR

Exit days \ Entry days	1	3	5	10	15	20	25	30	35	40	45	50	55	60	65	70	100	200
40.9%																		
1						1.8%	1.1%	0.6%	1.2%	1.4%	0.7%	0.5%	0.4%	0.5%	0.3%	0.5%	0.0%	1.0%
3						37.2%	35.2%	33.9%	33.6%	33.2%	31.1%	31.5%	31.6%	30.4%	29.8%	29.8%	31.0%	25.0%
5						39.1%	35.3%	34.9%	35.1%	35.5%	34.3%	34.8%	35.4%	33.8%	34.2%	34.4%	35.5%	31.6%
10	51.3%					40.9%	41.3%	41.2%	42.4%	42.9%	42.0%	42.5%	42.9%	42.9%	39.6%	39.7%	42.3%	39.7%
15	49.2%					36.2%	35.2%	35.6%	37.0%	37.9%	37.0%	37.4%	38.0%	37.9%	33.6%	34.2%	36.9%	34.7%
20	48.0%					34.4%	34.4%	34.8%	36.2%	37.1%	36.1%	36.6%	37.1%	37.1%	32.9%	33.3%	36.1%	34.3%
25	43.1%						28.6%	28.9%	31.4%	32.4%	31.1%	31.8%	32.4%	32.3%	27.9%	28.1%	31.3%	29.9%
30	40.0%					40.1%	33.0%	27.0%	29.6%	30.5%	29.3%	30.0%	30.5%	29.3%	26.3%	26.7%	30.0%	29.9%
35	41.4%								23.7%	27.4%	23.0%	25.5%	27.3%	21.6%	22.3%	22.5%	29.0%	29.5%
40	40.3%									26.4%	23.5%	25.3%	27.0%	21.5%	22.1%	22.3%	28.9%	29.4%
45	40.4%									30.5%	21.8%	25.0%	26.8%	21.4%	21.9%	22.2%	28.7%	29.4%
50	39.2%											22.9%	26.1%	20.4%	22.3%	22.5%	28.9%	30.1%
55	33.2%										24.6%	2.0%	26.6%	20.7%	22.6%	22.8%	29.2%	30.5%
60	30.4%													18.7%	20.6%	20.8%	28.3%	29.9%
65	31.8%														19.7%	19.7%	24.1%	29.3%
70	33.2%															19.7%	24.1%	29.3%
100	30.6%															19.7%	24.1%	29.3%
200	22.7%													-4.9%	-5.1%	-4.9%	-2.9%	14.5%

8.3. ATR Stop & Next entry (pyramid) sensitivity analysis

Agriculture

Coffee

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
46.7%																		
0.025	10.7%	10.5%	10.2%	9.6%	7.9%	-9.0%	-7.6%	-12.9%	-17.5%	-17.2%	-9.3%	-16.4%	-16.0%	-15.2%	-14.4%	-11.5%	-12.3%	-12.3%
0.05	3.2%	3.0%	2.5%	1.5%	-1.2%													
0.1																		
0.2																		
0.4	42.8%	41.9%	37.4%	33.3%	24.0%	-10.5%	1.4%	0.3%	-47.3%	1.2%	-5.8%							
0.6	64.5%	57.7%	54.8%	49.1%	38.8%	38.8%	36.8%	33.7%	26.9%	24.7%	16.1%	11.1%	5.8%					
0.8	59.5%	59.4%	59.9%	53.5%	41.6%	34.6%	36.9%	35.7%	27.3%	24.9%	21.9%	13.7%	14.0%	17.1%	-1.5%			
1	89.9%	74.6%	60.3%	58.9%	53.9%	43.5%	36.4%	31.1%	46.9%	20.4%	26.3%	23.0%	24.5%	35.4%	33.5%	5.9%	-5.9%	9.8%
1.2	98.8%	98.1%	88.8%	56.2%	49.0%	32.4%	39.1%	36.0%	42.5%	35.8%	36.8%	20.7%	23.7%	31.8%	30.5%	7.6%	1.6%	14.2%
1.4	104.1%	101.5%	90.8%	67.0%	50.5%	35.6%	27.2%	37.3%	36.5%	30.9%	27.4%	33.2%	11.5%	25.7%	28.0%	15.4%	9.8%	14.1%
1.6	102.1%	83.1%	81.1%	65.6%	53.8%	32.3%	7.9%	36.9%	28.1%	27.2%	9.8%	28.4%	32.8%	28.8%	24.2%	3.4%	10.6%	9.0%
1.8	98.8%	84.0%	82.4%	68.4%	56.7%	19.3%		27.9%	24.1%	20.8%	15.5%	26.5%	26.1%	24.3%	24.6%	13.0%	13.1%	11.2%
2	84.4%	82.7%	69.4%	67.7%	53.6%	40.2%	24.6%	32.4%	35.0%	23.3%	35.9%	29.9%	24.3%	20.8%	23.5%	10.8%	11.3%	8.4%
2.5	103.2%	83.9%	81.7%	67.6%	56.7%	41.6%	11.2%	40.7%	35.5%	31.3%	30.5%	35.7%	33.9%	22.6%	22.7%	13.0%	15.0%	11.1%
3	91.6%	83.0%	80.2%	66.2%	55.5%	47.4%	20.9%	36.3%	36.3%	37.1%	28.0%	37.9%	33.5%	26.6%	24.1%	14.6%	14.6%	8.9%
5	103.0%	83.3%	81.3%	66.5%	56.4%	47.9%	31.2%	42.6%	38.7%	38.5%	32.3%	39.1%	36.3%	29.2%	24.4%	15.5%	15.4%	11.2%
10	103.0%	83.3%	81.3%	66.5%	56.4%	47.9%	31.2%	42.6%	38.7%	38.5%	32.3%	39.1%	36.3%	29.2%	24.4%	15.5%	15.4%	11.2%
15	103.0%	83.3%	81.3%	66.5%	56.4%	47.9%	31.2%	42.6%	38.7%	38.5%	32.3%	39.1%	36.3%	29.2%	24.4%	15.5%	15.4%	11.2%

Corn

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
66.3%																		
0.025	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%	-6.7%
0.05	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%	-18.9%
0.1	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%	-56.0%
0.2			-55.3%			-51.8%	-52.4%		-54.6%	-54.0%		-55.0%	-55.0%	-55.0%	-55.0%	-55.0%	-55.0%	-55.0%
0.4	43.0%	43.2%	42.0%	33.3%	25.6%	25.3%				-43.3%		-11.2%	-64.3%	-51.0%	-50.8%	-62.7%	-53.8%	-66.1%
0.6	65.6%	61.8%	59.7%	58.1%	51.9%	60.0%	50.3%	56.5%	44.7%	44.6%	45.7%	42.2%	42.0%	34.6%	5.9%	27.5%	-18.7%	3.4%
0.8	83.2%	81.9%	77.2%	63.8%	58.7%	63.1%	55.5%	62.1%	50.3%	53.4%	49.4%	47.2%	46.2%	37.8%	43.2%	16.2%	15.4%	19.2%
1	87.6%	85.8%	84.0%	81.3%	59.1%	57.7%	59.3%	61.5%	59.7%	53.0%	52.2%	51.3%	51.3%	45.0%	46.8%	27.1%	28.6%	23.9%
1.2	92.1%	91.0%	78.8%	72.5%	57.6%	55.3%	50.8%	57.4%	56.8%	49.9%	51.2%	47.2%	48.3%	44.3%	45.2%	25.4%	27.6%	23.0%
1.4	91.3%	89.9%	83.0%	73.1%	58.8%	50.2%	55.8%	55.9%	53.1%	46.7%	47.2%	45.5%	45.5%	44.4%	44.2%	25.8%	26.4%	21.9%
1.6	91.5%	90.1%	80.6%		58.9%	48.3%	50.1%	52.6%	53.1%	50.5%	46.5%	46.5%	44.5%	43.1%	44.1%	24.9%	26.3%	21.7%
1.8	89.8%	88.5%	85.8%	76.6%	54.8%	47.5%	51.7%	49.4%	52.4%	46.2%	45.0%	45.3%	44.2%	43.7%	43.5%	23.4%	25.7%	21.1%
2	89.1%	87.7%	80.5%	75.6%	57.2%	51.6%	50.2%	47.2%	55.0%	46.1%	43.5%	44.5%	44.1%	43.7%	42.8%	22.5%	25.5%	21.1%
2.5	89.2%	87.7%	84.8%	75.9%	57.2%	48.5%	47.6%	43.7%	54.8%	48.8%	43.8%	44.5%	42.4%	44.6%	41.2%	37.9%	26.0%	21.1%
3	88.8%	87.3%	84.4%	75.7%	57.1%	51.0%		43.9%	53.6%	49.0%	44.3%	44.4%	44.1%	45.6%	40.8%	37.4%	25.5%	20.5%
5	88.8%	87.3%	84.4%	75.4%	56.3%	48.4%		43.6%	53.2%	46.9%	43.9%	44.1%	44.1%	44.8%	42.2%	37.6%	25.4%	20.3%
10	88.8%	87.3%	84.3%	75.4%	56.8%	48.4%		43.8%	53.2%	47.5%	44.2%	43.5%	44.1%	44.8%	42.2%	37.6%	25.4%	20.3%
15	88.8%	87.3%	84.3%	75.4%	56.8%	48.4%		43.8%	53.2%	47.5%	44.2%	43.5%	44.1%	44.8%	42.2%	37.6%	25.4%	20.3%

Cotton

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
63.7%																		
0.025	-11.2%	-10.9%	-10.4%	-10.5%	-9.8%	-10.6%	-10.4%	-10.2%	-11.1%	-11.1%	-11.1%	-11.1%	-11.1%	-11.1%	-11.1%	-11.1%	-11.1%	-11.1%
0.05																		
0.1																		
0.2																		
0.4	60.3%	45.2%	44.6%	43.2%	27.7%	10.2%			-6.1%				6.9%					
0.6	69.4%	68.7%	52.7%	53.5%	39.3%	38.3%	34.4%	25.8%	35.8%	0.0%	7.4%	24.3%	16.4%	3.9%	22.7%		-15.9%	11.8%
0.8	78.7%	81.0%	68.3%	61.3%	55.9%	53.3%	38.1%	34.5%	53.0%	28.5%	21.2%	35.3%	25.4%	18.1%	26.1%	3.2%	15.1%	13.5%
1	89.8%	89.5%	87.7%	72.1%	63.5%	61.9%	60.5%	56.1%	37.5%	52.9%	45.3%	39.6%	49.0%	21.7%	25.2%	0.1%	-3.0%	17.4%
1.2	99.3%	88.6%	87.5%	85.6%	64.6%	62.4%	60.2%	57.6%	42.6%	55.2%	46.9%	36.1%	48.2%	11.1%	19.2%	-7.2%	-0.5%	18.2%
1.4	98.8%	107.0%	92.7%	75.3%	71.2%	66.3%	67.6%	62.6%	60.8%	62.1%	58.7%	53.8%	52.3%	25.3%	29.9%	4.3%	13.5%	21.6%
1.6	95.5%	93.0%	75.1%	74.0%	71.7%	66.2%	68.4%	64.5%	61.6%	62.0%	59.9%	55.7%	51.8%	48.5%	25.6%	16.4%	15.2%	24.4%
1.8	92.7%	91.5%	77.5%	73.1%	70.4%	68.3%	68.2%	64.1%	61.3%	61.9%	58.4%	53.6%	52.6%	46.7%	14.3%	15.6%	9.5%	22.1%
2	98.2%	82.6%	78.2%	76.3%	71.8%	69.0%	68.3%	63.0%	61.2%	60.9%	59.0%	53.7%	51.5%	47.0%	9.8%	5.2%	6.2%	20.9%
2.5	97.0%	96.7%	79.1%	75.1%	72.2%	68.0%	66.7%	62.8%	58.1%	58.8%	57.4%	54.0%	50.5%	47.7%		37.9%	2.8%	21.8%
3	97.0%	95.5%	77.4%	75.5%	71.7%	68.8%	65.3%	62.5%	58.5%	56.8%	58.3%	55.7%	51.2%	47.8%	36.4%	34.1%	19.2%	21.1%
5	96.9%	95.5%	77.2%	75.4%	72.0%	68.9%	66.5%	64.3%	59.0%	58.5%	58.2%	55.7%	52.2%	50.8%	42.0%	31.7%	19.2%	21.3%
10	96.9%	95.5%	77.2%	75.4%	72.0%	68.9%	66.5%	64.3%	59.0%	58.5%	58.2%	55.7%	52.2%	50.8%	42.0%	31.7%	19.2%	21.3%
15	96.9%	95.5%	77.2%	75.4%	72.0%	68.9%	66.5%	64.3%	59.0%	58.5%	58.2%	55.7%	52.2%	50.8%	42.0%	31.7%	19.2%	21.3%

Soybean

ATR stop \ Next pyramid/entry ATR	28.9%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025		-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%
0.05		-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%	-11.9%
0.1																			
0.2																			
0.4		12.8%	11.1%	11.0%	8.5%	7.8%	8.0%	4.6%	7.3%			-7.5%							
0.6		31.5%	30.8%	29.3%	28.8%	24.0%	14.6%	12.3%	13.0%	11.6%	7.4%	9.7%	6.8%	-0.1%	7.0%	6.0%	1.8%	-13.7%	-15.5%
0.8		33.5%	33.3%	32.7%	30.8%	30.0%	28.5%	25.0%	24.2%	22.5%	20.3%	18.4%	13.9%	9.6%	11.7%	7.8%	5.5%	-2.5%	0.0%
1		33.7%	33.6%	33.2%	31.6%	28.8%	29.8%	25.8%	20.9%	23.4%	17.1%	18.7%	16.3%	8.9%	14.3%	8.2%	5.1%	1.0%	2.5%
1.2		33.1%	32.9%	32.5%	31.3%	28.2%	28.3%	26.0%	25.1%	23.4%	18.4%	16.5%	20.4%	10.8%	13.8%	5.4%	2.0%	-2.0%	0.3%
1.4		34.3%	33.6%	32.7%	32.1%	29.9%	28.2%	27.7%	24.9%	23.4%	19.0%	14.9%	21.6%	15.8%	15.5%	4.5%	3.7%	2.9%	3.5%
1.6		34.8%	34.7%	33.1%	31.4%	28.5%	26.6%	27.1%	26.4%	23.7%	23.1%	13.6%	21.8%	16.9%	14.2%	6.9%	2.3%	3.0%	3.2%
1.8		34.8%	34.7%	34.1%	32.0%	28.2%	26.7%	26.3%	25.3%	23.6%	22.5%	16.2%	20.0%	19.8%	16.3%	11.1%	1.8%	2.1%	2.9%
2		34.3%	34.2%	33.7%	32.4%	28.0%	27.6%	24.9%	24.5%	21.7%	21.5%	15.5%	18.2%	17.9%	16.8%	8.8%	0.9%	0.6%	1.8%
2.5		34.5%	34.3%	33.7%	32.8%	29.6%	28.2%	26.5%	26.5%	24.6%	18.3%	20.7%	21.3%	20.0%	13.8%	8.0%	-1.3%	-2.6%	0.2%
3		34.4%	34.2%	33.6%	32.6%	29.2%	27.7%	25.9%	26.4%	24.7%	21.8%	20.6%	21.3%	19.9%	14.8%	8.8%	-4.8%	-1.5%	0.4%
5		34.7%	34.5%	33.7%	31.1%	28.9%	27.9%	26.8%	25.5%	23.6%	22.0%	19.2%	22.1%	18.6%	13.9%	9.3%	-0.1%	2.4%	1.4%
10		34.7%	34.5%	33.8%	31.1%	29.0%	27.7%	26.8%	25.4%	22.8%	21.9%	18.9%	22.1%	18.8%	13.9%	8.9%	-0.4%	2.2%	1.2%
15		34.7%	34.5%	33.8%	31.1%	29.0%	27.7%	26.8%	25.4%	22.8%	21.9%	18.9%	22.1%	18.8%	13.9%	8.9%	-0.4%	2.2%	1.2%

Sugar

ATR stop \ Next pyramid/entry ATR	57.8%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025		-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%
0.05		-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%	-17.1%
0.1																			
0.2		-75.3%			-51.8%							-63.8%				-62.2%	-56.2%	-55.0%	-55.0%
0.4		15.8%	15.5%	15.2%				-2.3%		-6.6%		-3.7%	-31.9%	-31.6%	-22.2%	-46.6%			
0.6		53.3%	53.7%	53.7%	51.2%	44.3%	39.7%	42.4%	34.0%		31.8%	34.4%	29.0%		10.2%	17.7%			
0.8		98.0%	95.4%	78.8%	78.2%	58.4%	55.4%	55.9%	49.8%	44.8%	45.3%	38.9%	34.9%	40.1%	22.9%	29.9%	19.2%	14.2%	13.9%
1		100.9%	100.1%	94.9%	93.1%	76.3%	56.1%	60.1%	49.8%	50.8%	49.3%	42.9%	41.8%	38.9%	32.3%	27.7%	20.2%	15.6%	16.7%
1.2		104.1%	102.5%	100.0%	94.4%	87.7%	58.0%	58.6%	55.2%	50.8%	48.8%	37.2%	40.2%	42.4%	37.4%	34.3%	24.9%	17.2%	18.9%
1.4		104.0%	103.0%	102.3%	97.9%	86.8%	74.9%	62.1%	56.7%	53.7%	47.0%	45.4%	37.6%	41.1%	34.8%	32.6%	22.9%	14.8%	17.4%
1.6		102.5%	102.5%	101.9%	100.1%	73.0%	71.0%	57.7%	52.7%	54.6%	46.3%	43.6%	33.9%	40.9%	36.0%	34.2%	21.3%	16.9%	16.4%
1.8		101.5%	101.7%	101.0%	98.7%	76.0%	70.4%	60.0%	51.7%	54.2%	50.0%	43.2%	39.3%	39.2%	35.4%	32.0%	19.6%	14.6%	14.5%
2		101.2%	100.7%	100.6%	99.2%	87.3%	68.5%	58.7%	52.1%	53.5%	49.4%	42.8%	39.2%	37.8%	35.6%	31.3%	19.7%	15.5%	15.9%
2.5		100.6%	100.1%	99.8%	98.0%	87.5%	76.5%	56.2%	51.6%	52.3%	49.3%	44.8%	41.8%	36.7%	33.7%	26.2%	18.3%	12.9%	14.0%
3		100.6%	100.1%	99.7%	97.9%	89.3%	75.8%	58.4%	52.7%	53.5%	50.1%	45.6%	41.3%	41.0%	35.9%	24.6%	21.5%	11.5%	13.0%
5		101.6%	101.0%	100.3%	98.3%	89.9%	78.9%	68.0%	54.0%	53.3%	49.5%	43.3%	42.8%	39.7%	37.3%	27.8%	22.3%	11.7%	12.9%
10		101.6%	101.0%	100.3%	98.3%	89.9%	78.9%	68.0%	54.0%	53.3%	50.9%	44.2%	42.8%	41.1%	37.3%	27.8%	22.3%	11.7%	12.9%
15		101.6%	101.0%	100.3%	98.3%	89.9%	78.9%	68.0%	54.0%	53.3%	50.9%	44.2%	42.8%	41.1%	37.3%	27.8%	22.3%	11.7%	12.9%

Sunflower seeds

ATR stop \ Next pyramid/entry ATR	63.0%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025		15.3%	15.2%	15.0%	14.6%	10.6%	10.1%	10.0%	9.3%	7.2%	6.1%	8.5%	7.7%	8.5%	2.7%	5.7%	1.2%	1.0%	1.0%
0.05		14.5%	14.4%	14.2%	13.9%	9.8%	9.4%	9.0%	8.4%	6.2%	4.6%	7.3%	6.4%	7.3%	0.4%	4.0%	-1.3%	-1.5%	-1.5%
0.1		15.3%	15.1%	14.3%	13.9%	10.0%	9.2%	8.7%	7.3%	5.1%	2.9%	6.2%	5.6%	6.8%	-2.2%	2.1%	-6.3%	-6.6%	-6.6%
0.2		36.3%	36.2%	30.6%	30.4%	42.4%	29.2%	28.7%	28.7%	27.9%	26.5%	26.3%	25.6%	19.3%	19.1%	15.3%	14.4%	6.4%	4.2%
0.4		58.3%	58.2%	58.0%	57.3%	58.0%	55.6%	50.0%	44.6%	43.7%	41.6%	41.6%	43.7%	40.9%	30.8%	33.9%	24.8%	17.4%	10.4%
0.6		63.6%	63.3%	62.3%	61.8%	60.4%	60.3%	58.6%	55.6%	53.2%	51.4%	45.5%	48.5%	46.0%	42.1%	42.5%	33.3%	19.6%	15.4%
0.8		67.0%	66.8%	65.9%	64.3%	62.8%	61.8%	60.0%	56.7%	55.0%	49.6%	47.4%	52.9%	52.9%	41.9%	44.1%	33.7%	23.4%	19.7%
1		68.4%	68.3%	67.2%	66.6%	63.8%	62.1%	60.8%	57.8%	56.2%	53.7%	49.7%	52.1%	53.2%	42.8%	45.2%	37.7%	24.0%	23.5%
1.2		68.6%	68.5%	68.1%	66.8%	64.7%	62.6%	61.1%	58.9%	57.2%	54.7%	48.3%	52.3%	52.6%	47.1%	44.5%	37.8%	23.6%	22.2%
1.4		69.3%	69.2%	68.7%	67.9%	66.0%	64.6%	62.4%	62.2%	59.5%	56.1%	53.7%	52.9%	53.2%	51.2%	47.2%	38.5%	23.7%	23.9%
1.6		69.2%	69.1%	68.7%	67.9%	66.0%	64.6%	63.1%	62.3%	60.8%	56.7%	55.3%	54.0%	53.9%	52.3%	47.6%	37.8%	23.4%	24.0%
1.8		69.6%	69.4%	68.9%	67.8%	66.0%	65.0%	63.7%	62.3%	61.3%	57.3%	55.0%	55.6%	54.8%	52.1%	45.5%	37.7%	25.4%	24.4%
2		69.6%	69.4%	68.9%	68.0%	65.7%	64.9%	63.4%	62.7%	60.8%	59.3%	54.5%	55.5%	54.6%	51.3%	45.1%	36.7%	24.9%	23.6%
2.5		69.2%	69.0%	68.4%	67.6%	66.1%	64.8%	63.3%	61.6%	60.5%	58.5%	57.2%	55.0%	54.1%	52.0%	43.9%	36.0%	24.3%	23.5%
3		69.2%	68.9%	68.4%	67.6%	66.0%	64.8%	63.1%	61.3%	60.4%	58.3%	56.7%	55.5%	53.7%	51.6%	47.7%	35.4%	24.5%	21.7%
5		69.2%	69.0%	68.5%	67.6%	65.9%	64.7%	63.1%	61.4%	60.4%	58.5%	56.7%	55.7%	53.8%	51.5%	48.4%	36.1%	23.8%	20.6%
10		69.2%	69.0%	68.5%	67.6%	65.9%	64.7%	63.1%	61.4%	60.4%	58.5%	56.7%	55.7%	53.9%	51.6%	48.5%	36.1%	23.8%	24.2%
15		69.2%	69.0%	68.5%	67.6%	65.9%	64.7%	63.1%	61.4%	60.4%	58.5%	56.7%	55.7%	53.9%	51.6%	48.5%	36.1%	23.8%	24.2%

Wheat

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
50.7%																		
0.025	8.6%	8.4%	8.0%	7.2%	5.5%	3.8%	2.1%	4.4%	0.3%	0.7%	1.1%	2.9%	1.3%	-0.2%	0.2%	-0.5%	-0.5%	-0.5%
0.05	7.4%	7.2%	6.8%	6.0%	4.2%	2.0%	0.1%	2.8%	1.6%	-1.4%	-0.9%	1.2%	-0.7%	-2.4%	-1.9%	-2.6%	-2.6%	-2.6%
0.1	4.9%	4.7%	4.3%	3.2%	1.0%	-2.0%	-5.0%	-1.2%	-2.8%	-7.1%	-6.4%	-3.2%	-5.8%	-8.5%	-7.8%	-8.7%	-8.7%	-8.7%
0.2	14.0%	13.9%	13.4%	12.5%	5.1%	-8.8%	-17.0%	-6.5%	-9.4%	-4.5%	-11.3%	-7.5%	-9.6%	-18.7%	-17.5%	-24.2%	-22.6%	-22.6%
0.4	54.1%	53.1%	52.4%	50.9%	34.2%	22.6%	12.3%	25.5%	25.5%	16.4%	15.4%	8.3%	13.8%	7.0%	3.8%	12.1%	2.8%	2.7%
0.6	64.2%	64.0%	62.6%	57.2%	51.8%	44.3%	41.5%	40.1%	30.2%	16.8%	29.7%	16.8%	19.8%	30.2%	20.0%	19.7%	13.2%	10.1%
0.8	65.4%	65.3%	64.8%	63.1%	55.0%	51.9%	48.9%	48.9%	41.9%	31.0%	32.0%	24.8%	21.5%	35.5%	22.8%	23.7%	14.4%	12.6%
1	65.1%	64.8%	64.0%	62.3%	55.4%	50.6%	50.2%	48.7%	44.7%	38.8%	34.4%	22.6%	24.4%	34.4%	37.2%	22.5%	13.9%	12.3%
1.2	65.6%	65.3%	64.6%	62.6%	57.1%	50.5%	47.4%	48.9%	44.4%	40.8%	36.4%	33.2%	40.1%	32.4%	36.8%	22.2%	15.0%	13.1%
1.4	67.5%	67.1%	65.6%	64.5%	59.5%	55.0%	50.3%	49.6%	47.9%	43.8%	45.5%	38.2%	40.0%	32.2%	37.2%	22.8%	15.5%	13.9%
1.6	67.5%	67.1%	66.6%	64.6%	61.4%	56.0%	50.1%	48.7%	43.5%	42.2%	44.6%	39.9%	39.2%	35.2%	36.9%	24.0%	15.9%	14.6%
1.8	67.5%	67.1%	66.4%	65.2%	61.0%	55.2%	48.9%	50.0%	42.2%	42.5%	43.3%	41.6%	38.2%	36.5%	36.3%	24.0%	15.8%	14.8%
2	67.1%	66.7%	66.2%	65.0%	61.6%	57.6%	50.6%	50.3%	46.0%	40.8%	41.6%	41.0%	36.6%	35.2%	35.2%	25.6%	15.8%	14.4%
2.5	67.2%	66.9%	66.4%	64.6%	61.2%	58.2%	49.8%	50.1%	39.8%	40.1%	40.4%	37.7%	37.0%	37.1%	35.9%	25.6%	15.5%	14.2%
3	67.0%	66.7%	66.2%	65.0%	61.0%	57.9%	53.7%	47.4%	46.1%	40.0%	41.2%	38.9%	40.2%	36.8%	35.1%	25.4%	15.5%	14.2%
5	67.8%	67.4%	66.8%	65.5%	60.9%	58.1%	54.2%	50.1%	44.7%	41.8%	42.2%	41.0%	37.0%	38.5%	35.9%	25.6%	15.6%	14.3%
10	67.7%	67.4%	66.8%	65.5%	62.2%	59.4%	54.9%	51.5%	46.1%	43.7%	42.2%	41.5%	38.0%	38.1%	36.4%	25.5%	15.5%	14.1%
15	67.7%	67.4%	66.8%	65.5%	62.2%	59.4%	54.9%	51.5%	46.1%	43.7%	42.2%	41.5%	38.0%	38.1%	36.4%	25.5%	15.5%	14.1%

White Maize

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
46.2%																		
0.025	16.0%	16.0%	15.9%	15.7%	6.9%	5.9%	13.5%	3.7%	2.8%	2.8%	1.8%	2.4%	2.9%	9.9%	-0.2%	4.0%	1.8%	1.3%
0.05	20.8%	20.8%	20.7%	20.5%	16.2%	15.7%	18.8%	1.3%	0.2%	13.5%	12.8%	4.1%	12.5%	11.5%	9.2%	7.8%	3.6%	2.4%
0.1	19.4%	19.4%	19.4%	19.2%	18.4%	18.1%	17.6%	13.1%	1.3%	13.2%	11.1%	-0.9%	10.8%	10.7%	7.0%	5.2%	-0.7%	-2.8%
0.2	22.1%	19.6%	19.6%	19.0%	18.9%	18.3%	17.5%	13.9%	-0.7%	13.7%	11.8%	-3.1%	10.0%	10.1%	4.4%	1.3%		
0.4	44.7%	44.4%	42.5%	41.5%	37.8%	34.7%	29.0%	18.6%	24.3%	20.6%	20.1%	18.9%	19.6%	16.3%	12.0%	9.5%	1.1%	-1.1%
0.6	51.2%	49.2%	48.4%	47.2%	44.6%	43.2%	40.2%	35.9%	38.5%	38.1%	31.0%	30.2%	34.0%	23.9%	20.8%	15.2%	7.8%	6.5%
0.8	51.1%	51.7%	51.6%	49.4%	46.9%	45.4%	42.9%	41.9%	40.9%	39.9%	38.5%	38.8%	37.1%	31.1%	32.8%	19.5%	10.2%	8.2%
1	50.7%	50.8%	50.5%	50.0%	48.5%	45.4%	42.8%	41.6%	40.9%	39.3%	37.7%	37.9%	37.4%	30.5%	32.6%	18.9%	10.5%	7.7%
1.2	50.2%	50.4%	50.2%	49.9%	49.0%	45.6%	43.0%	40.7%	39.7%	39.2%	37.3%	37.0%	37.1%	31.4%	31.6%	20.1%	10.2%	6.6%
1.4	49.2%	49.8%	49.2%	49.2%	48.1%	44.9%	43.4%	40.1%	39.1%	38.4%	36.4%	35.8%	36.8%	35.6%	31.1%	18.6%	10.0%	6.7%
1.6	50.0%	50.0%	49.7%	48.9%	47.9%	44.9%	42.5%	38.9%	39.4%	39.7%	35.2%	35.1%	36.9%	36.4%	31.5%	17.6%	11.2%	6.8%
1.8	48.3%	48.2%	48.0%	47.1%	46.5%	44.0%	42.2%	39.7%	38.7%	39.2%	34.2%	33.8%	36.0%	35.3%	32.4%	16.4%	10.6%	5.6%
2	48.2%	48.2%	47.6%	47.0%	45.9%	44.3%	42.0%	40.8%	37.9%	38.5%	37.0%	32.7%	35.6%	34.1%	31.6%	15.0%	10.1%	5.2%
2.5	48.3%	48.2%	47.6%	47.1%	45.2%	43.4%	41.8%	40.4%	39.4%	37.9%	36.8%	35.4%	35.1%	30.4%	30.3%	14.1%	9.7%	5.2%
3	48.5%	48.4%	48.0%	46.9%	45.1%	42.9%	41.4%	40.3%	40.0%	37.3%	36.3%	35.4%	34.9%	31.2%	28.7%	14.8%	9.9%	5.9%
5	49.8%	49.8%	49.4%	47.7%	45.4%	42.7%	41.2%	39.9%	39.7%	37.4%	35.8%	34.9%	35.0%	29.0%	25.0%	13.0%	9.7%	6.1%
10	49.8%	49.8%	49.4%	47.7%	45.7%	42.7%	41.2%	39.9%	39.8%	37.5%	35.9%	35.0%	35.0%	29.2%	25.0%	12.5%	9.7%	6.1%
15	49.8%	49.8%	49.4%	47.7%	45.7%	42.7%	41.2%	39.9%	39.8%	37.5%	35.9%	35.0%	35.0%	29.2%	25.0%	12.5%	9.7%	6.1%

Yellow Maize

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
46.0%																		
0.025	14.1%	14.0%	13.9%	12.8%	11.4%	13.7%	4.1%	5.2%	2.2%	9.8%	8.5%	8.4%	8.8%	5.0%	5.9%	6.5%	2.8%	1.6%
0.05	15.3%	15.2%	15.0%	12.0%	10.4%	12.9%	1.8%	3.2%	-0.6%	8.6%	7.2%	7.1%	7.6%	3.0%	4.2%	5.0%	0.4%	-1.1%
0.1	14.8%	14.8%	14.6%	14.2%	8.5%	11.7%	7.1%	-1.2%	-6.4%	10.9%	5.4%	5.3%	5.2%	-1.0%	1.2%	1.4%	-5.1%	-8.5%
0.2	23.7%	23.6%	23.4%	20.2%	14.0%	14.4%	6.2%	-5.9%	-2.4%	12.1%	5.6%	5.8%	3.5%	-4.1%	-0.3%	0.8%		-9.9%
0.4	46.5%	46.2%	46.0%	44.6%	43.2%	42.5%	39.1%	21.5%	25.1%	21.1%	13.9%	20.2%	15.0%	14.2%	11.2%	11.8%	7.2%	3.2%
0.6	48.9%	48.2%	47.8%	46.9%	45.9%	45.3%	41.8%	37.7%	35.0%	36.2%	30.4%	26.3%	29.8%	20.2%	18.1%	12.9%	9.8%	7.1%
0.8	51.3%	51.1%	50.9%	49.6%	47.2%	46.7%	43.3%	42.3%	39.5%	37.2%	36.6%	34.6%	35.5%	30.4%	28.5%	21.7%	12.9%	8.9%
1	52.0%	52.0%	51.3%	50.0%	47.8%	46.5%	44.8%	43.8%	41.8%	40.1%	37.2%	34.1%	36.8%	29.7%	32.7%	23.1%	13.4%	9.7%
1.2	52.6%	52.5%	52.0%	50.8%	48.8%	46.3%	45.9%	45.5%	43.2%	42.2%	40.4%	38.8%	40.5%	34.6%	29.2%	22.9%	11.7%	13.0%
1.4	52.7%	52.6%	52.0%	51.2%	49.2%	46.3%	46.4%	45.2%	43.5%	41.5%	41.1%	39.3%	40.1%	37.2%	33.4%	22.5%	11.1%	12.9%
1.6	52.7%	52.6%	51.8%	50.9%	49.0%	46.4%	45.7%	44.6%	43.4%	41.9%	42.0%	38.1%	38.6%	35.0%	32.5%	21.6%	12.7%	12.6%
1.8	52.2%	52.2%	51.7%	50.7%	48.9%	46.8%	44.7%	43.7%	42.6%	40.5%	41.2%	37.5%	38.0%	36.0%	31.5%	21.1%	11.9%	12.2%
2	51.9%	51.9%	51.3%	50.7%	48.5%	46.5%	44.6%	43.5%	41.7%	40.1%	40.9%	39.5%	37.6%	35.4%	32.5%	22.6%	12.1%	11.6%
2.5	51.7%	51.6%	51.0%	49.6%	47.4%	45.5%	44.5%	42.0%	41.1%	39.3%	39.3%	37.4%	36.2%	33.4%	32.0%	21.5%	12.1%	11.6%
3	52.0%	51.7%	51.0%	49.8%	47.0%	44.7%	44.4%	40.9%	40.1%	38.6%	38.8%	36.3%	35.1%	32.1%	29.7%	18.3%	11.5%	11.1%
5	51.8%	51.6%	51.2%	50.1%	48.1%	45.7%	45.1%	42.0%	40.7%	38.6%	38.2%	35.3%	31.2%	30.7%	26.7%	16.9%	9.9%	10.8%
10	51.8%	51.6%	51.2%	50.1%	48.1%	45.7%	45.1%	41.9%	40.7%	39.0%	38.8%	35.8%	32.8%	30.7%	25.4%	14.8%	9.6%	10.9%
15	51.8%	51.6%	51.2%	50.1%	48.1%	45.7%	45.1%	41.9%	40.7%	39.0%	38.8%	35.8%	32.8%	30.7%	25.4%	14.8%	9.6%	10.9%

Currencies

AUD/ZAR

ATR stop	Next pyramid/entry ATR																	
5.5%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
0.05	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
0.1	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%
0.2	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%	-3.9%
0.4	-5.5%	-6.3%	-7.6%	-7.4%	-9.1%	-8.5%	-8.6%	-8.4%	-7.9%	-8.2%	-8.0%	-8.1%	-8.2%	-7.7%	-8.0%	-7.8%	-7.8%	-7.8%
0.6	7.5%	6.9%	6.4%	5.6%	5.1%	2.3%	1.1%	0.6%	0.1%	-2.9%	-1.8%	-2.0%	-2.9%	-0.4%	-3.6%	-0.2%	-2.1%	-2.3%
0.8	8.8%	8.7%	7.8%	7.4%	5.4%	4.4%	3.4%	3.5%	2.9%	3.5%	1.2%	2.3%	0.7%	2.3%	-0.5%	1.0%	-0.1%	-0.6%
1	9.1%	8.7%	8.6%	7.6%	6.0%	4.6%	4.9%	2.7%	5.2%	4.3%	4.0%	4.2%	3.1%	2.9%	2.6%	1.3%	0.6%	-0.2%
1.2	9.1%	8.9%	8.7%	7.8%	6.7%	5.9%	5.8%	5.1%	5.6%	5.1%	5.3%	3.8%	3.6%	3.0%	3.0%	2.1%	1.0%	0.2%
1.4	9.7%	9.5%	9.3%	8.3%	7.2%	6.3%	6.1%	5.6%	5.6%	4.9%	5.4%	4.7%	4.8%	3.4%	3.4%	2.3%	1.3%	0.6%
1.6	10.2%	9.8%	9.2%	8.6%	7.2%	6.5%	5.7%	5.6%	5.5%	5.0%	5.4%	5.2%	4.9%	3.7%	3.7%	2.3%	1.3%	0.8%
1.8	10.2%	10.0%	9.7%	8.7%	7.4%	6.7%	6.2%	5.9%	5.5%	4.7%	5.2%	5.1%	4.9%	4.1%	3.6%	2.5%	1.4%	1.0%
2	10.1%	10.0%	9.7%	8.6%	7.4%	6.7%	6.5%	6.0%	5.8%	4.6%	5.0%	5.2%	4.9%	4.3%	3.6%	2.5%	1.4%	1.0%
2.5	10.2%	10.1%	9.6%	8.8%	7.9%	6.9%	6.5%	6.3%	6.2%	5.4%	4.9%	4.9%	4.9%	4.3%	3.7%	2.7%	1.4%	1.2%
3	10.2%	10.1%	9.7%	8.7%	7.8%	7.2%	6.6%	6.4%	6.1%	5.6%	4.9%	4.7%	4.8%	4.2%	3.6%	2.6%	1.3%	1.2%
5	10.5%	10.4%	10.0%	9.2%	8.1%	7.4%	6.7%	6.5%	6.3%	5.6%	4.8%	4.8%	4.8%	4.4%	3.5%	2.7%	1.4%	1.3%
10	10.5%	10.4%	10.0%	9.2%	8.1%	7.4%	6.7%	6.5%	6.3%	5.6%	5.0%	4.8%	4.8%	4.4%	3.5%	2.7%	1.4%	1.3%
15	10.5%	10.4%	10.0%	9.2%	8.1%	7.4%	6.7%	6.5%	6.3%	5.6%	5.0%	4.8%	4.8%	4.4%	3.5%	2.7%	1.4%	1.3%

BWP/ZAR

ATR stop	Next pyramid/entry ATR																	
-2.3%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
0.05	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
0.1	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
0.2	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
0.4	-1.4%	-1.3%	-1.3%	-1.2%	-1.2%	-1.2%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%
0.6	-1.8%	-1.8%	-2.0%	-1.8%	-1.6%	-1.5%	-1.4%	-1.3%	-1.2%	-1.2%	-1.2%	-1.2%	-1.2%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%
0.8	-2.1%	-2.2%	-2.5%	-2.8%	-2.2%	-1.9%	-1.7%	-1.5%	-1.3%	-1.3%	-1.3%	-1.2%	-1.2%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%
1	-2.6%	-2.7%	-2.7%	-2.8%	-2.7%	-2.2%	-2.0%	-1.6%	-1.4%	-1.3%	-1.3%	-1.3%	-1.3%	-1.2%	-1.2%	-1.2%	-1.2%	-1.2%
1.2	-2.5%	-2.5%	-2.7%	-2.3%	-2.4%	-2.3%	-2.0%	-1.6%	-1.4%	-1.2%	-1.2%	-1.2%	-1.1%	-1.0%	-1.0%	-1.0%	-0.9%	-0.9%
1.4	-1.9%	-2.2%	-2.4%	-2.4%	-1.9%	-1.8%	-1.8%	-1.5%	-1.3%	-1.1%	-1.0%	-1.0%	-0.9%	-0.8%	-0.8%	-0.8%	-0.7%	-0.7%
1.6	-1.9%	-1.9%	-2.2%	-1.9%	-1.8%	-1.8%	-1.9%	-1.6%	-1.3%	-1.1%	-1.1%	-1.0%	-1.0%	-0.9%	-0.8%	-0.7%	-0.7%	-0.7%
1.8	-1.8%	-1.8%	-2.1%	-1.9%	-1.7%	-1.6%	-1.5%	-1.6%	-1.4%	-1.1%	-1.2%	-1.0%	-0.9%	-0.8%	-0.8%	-0.7%	-0.7%	-0.7%
2	-1.8%	-1.9%	-2.3%	-1.8%	-1.7%	-1.5%	-1.5%	-1.3%	-1.5%	-1.2%	-1.1%	-1.0%	-0.9%	-0.7%	-0.8%	-0.7%	-0.6%	-0.6%
2.5	-1.7%	-1.7%	-1.8%	-1.7%	-1.5%	-1.4%	-1.3%	-1.2%	-1.2%	-1.4%	-1.3%	-1.0%	-1.0%	-0.7%	-0.7%	-0.7%	-0.6%	-0.6%
3	-1.5%	-1.8%	-2.0%	-1.6%	-1.6%	-1.4%	-1.4%	-1.2%	-1.2%	-1.2%	-1.5%	-0.9%	-0.9%	-0.7%	-0.7%	-0.8%	-0.6%	-0.6%
5	-1.8%	-1.9%	-2.1%	-1.9%	-1.7%	-1.4%	-1.4%	-1.2%	-1.2%	-1.1%	-1.2%	-0.9%	-0.9%	-0.7%	-0.6%	-0.7%	-0.6%	-0.6%
10	-1.5%	-1.6%	-1.8%	-1.6%	-1.5%	-1.3%	-1.3%	-1.2%	-1.1%	-1.1%	-1.2%	-0.9%	-0.8%	-0.6%	-0.6%	-0.7%	-0.6%	-0.6%
15	-1.5%	-1.6%	-1.8%	-1.6%	-1.5%	-1.3%	-1.3%	-1.2%	-1.1%	-1.1%	-1.2%	-0.9%	-0.8%	-0.6%	-0.6%	-0.7%	-0.6%	-0.6%

CAD/ZAR

ATR stop	Next pyramid/entry ATR																	
4.0%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
0.05	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%
0.1	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%
0.2	-4.4%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%
0.4	0.8%	0.8%	0.7%	-9.2%	-4.0%	-8.5%	-7.8%	-7.4%	-7.2%	-6.9%	-4.0%	-6.4%	-7.7%	-7.6%	-7.1%	-5.9%	-7.0%	-7.0%
0.6	6.6%	6.6%	5.3%	3.8%	-0.2%	-4.6%	-2.7%	-2.4%	-4.9%	-4.2%	0.2%	-1.9%	-2.1%	-3.5%	-0.9%	-2.7%	-3.8%	-3.7%
0.8	8.9%	8.6%	7.4%	5.9%	3.1%	-1.5%	0.5%	2.4%	1.8%	-1.8%	3.6%	1.2%	1.7%	-0.4%	0.6%	-1.2%	-1.7%	-1.6%
1	9.9%	9.4%	9.2%	5.5%	4.0%	3.5%	2.3%	4.2%	3.8%	1.1%	3.5%	3.0%	3.9%	3.5%	2.5%	-0.3%	-0.3%	-0.2%
1.2	10.9%	10.7%	10.0%	8.5%	6.2%	5.0%	3.0%	4.5%	3.6%	3.1%	3.4%	2.0%	3.7%	3.2%	3.3%	0.0%	0.2%	0.2%
1.4	11.2%	10.7%	10.5%	9.0%	6.1%	4.7%	3.6%	4.4%	4.2%	2.8%	3.2%	1.4%	3.1%	3.2%	3.2%	0.1%	0.2%	0.2%
1.6	11.5%	11.1%	10.5%	9.6%	6.8%	4.5%	4.8%	4.4%	4.2%	3.8%	3.5%	2.3%	3.1%	3.2%	3.1%	0.0%	0.3%	0.4%
1.8	11.7%	11.3%	11.0%	9.6%	7.2%	5.8%	5.6%	4.0%	3.9%	4.0%	3.8%	3.1%	2.9%	3.1%	3.1%	0.1%	0.4%	0.5%
2	11.9%	11.5%	11.0%	9.7%	7.6%	6.7%	5.7%	5.1%	4.4%	3.9%	3.8%	3.5%	3.6%	2.9%	2.9%	0.0%	0.4%	0.5%
2.5	11.7%	11.3%	10.9%	9.7%	7.8%	6.6%	5.9%	4.7%	4.0%	4.3%	3.5%	3.5%	3.0%	2.9%	2.9%	1.5%	0.5%	0.6%
3	11.6%	11.3%	10.9%	9.7%	7.9%	6.9%	5.7%	5.1%	4.0%	4.4%	4.5%	3.5%	3.0%	2.9%	2.8%	1.7%	0.4%	0.6%
5	11.6%	11.2%	10.7%	9.4%	7.7%	6.8%	6.0%	5.2%	4.2%	4.6%	4.4%	3.8%	3.3%	2.9%	2.8%	1.5%	0.2%	0.4%
10	11.8%	11.4%	11.0%	9.6%	7.8%	6.8%	6.0%	5.1%	4.2%	4.5%	4.3%	3.7%	2.9%	2.9%	2.7%	1.4%	0.1%	0.3%
15	11.8%	11.4%	11.0%	9.6%	7.8%	6.8%	6.0%	5.1%	4.2%	4.5%	4.3%	3.7%	3.2%	2.9%	2.7%	1.4%	0.1%	0.3%

CHF/ZAR

ATR stop \ Next pyramid/entry ATR	6.1%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
	0.025	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
	0.05	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%
	0.1	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%
	0.2	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%	-4.2%
	0.4	-1.3%	-1.2%	-0.9%	-1.8%	-2.1%	-4.2%	-3.6%	-4.0%	-4.8%	-6.0%	-6.6%	-6.7%	-6.5%	-6.0%	-6.1%	-6.3%	-6.1%	-6.3%
	0.6	4.3%	4.0%	3.5%	2.9%	2.1%	0.1%	0.6%	-4.3%	-1.8%	-0.2%	-0.3%	-5.1%	-5.8%	-5.6%	-4.4%	-2.6%	-4.7%	-4.5%
	0.8	8.8%	8.7%	7.9%	6.6%	4.1%	2.9%	2.9%	2.9%	1.1%	1.0%	2.2%	2.0%	-1.8%	-1.0%	-0.7%	0.3%	-1.4%	-0.8%
	1	10.1%	10.0%	9.5%	8.3%	6.9%	4.5%	2.5%	3.6%	4.9%	0.0%	3.0%	3.4%	1.0%	-0.3%	0.5%	1.2%	-0.5%	-0.3%
	1.2	10.3%	9.9%	9.4%	7.9%	7.3%	5.6%	3.4%	3.7%	4.6%	3.7%	2.6%	2.8%	3.4%	1.6%	2.7%	1.7%	0.7%	-0.1%
	1.4	10.9%	10.6%	10.3%	9.3%	7.2%	6.1%	4.1%	5.5%	4.9%	4.7%	2.3%	2.7%	3.4%	2.2%	2.9%	1.9%	1.2%	0.4%
	1.6	11.4%	11.1%	10.4%	9.4%	7.4%	6.1%	5.6%	5.4%	4.6%	4.8%	3.5%	2.1%	3.6%	4.2%	2.8%	2.2%	1.4%	0.3%
	1.8	11.5%	11.3%	10.6%	9.5%	7.7%	6.5%	5.8%	6.0%	5.0%	4.5%	4.8%	3.6%	3.4%	5.0%	3.5%	2.2%	1.4%	0.4%
	2	11.2%	10.9%	10.5%	9.4%	8.2%	6.3%	5.7%	6.3%	5.8%	4.2%	4.5%	3.3%	3.1%	4.9%	3.2%	1.8%	1.2%	0.4%
	2.5	11.9%	11.7%	11.1%	9.9%	8.6%	7.7%	7.2%	6.7%	6.7%	6.2%	6.1%	5.6%	4.0%	5.2%	4.4%	2.3%	1.6%	1.0%
	3	12.1%	11.8%	11.4%	10.4%	8.4%	8.1%	7.0%	7.2%	6.9%	6.3%	6.4%	6.3%	6.2%	5.2%	4.3%	2.5%	1.7%	1.1%
	5	12.1%	11.8%	11.4%	10.4%	8.9%	8.3%	7.4%	7.2%	7.0%	6.6%	6.4%	6.4%	6.3%	5.4%	4.1%	2.3%	1.8%	1.2%
	10	12.2%	11.9%	11.5%	10.5%	9.0%	8.3%	7.5%	7.2%	7.0%	6.6%	6.5%	6.4%	6.3%	5.4%	4.1%	2.4%	1.8%	1.2%
	15	12.2%	11.9%	11.5%	10.5%	9.0%	8.3%	7.5%	7.2%	7.0%	6.6%	6.5%	6.4%	6.3%	5.4%	4.1%	2.4%	1.8%	1.2%

CNY/ZAR

ATR stop \ Next pyramid/entry ATR	1.8%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
	0.025	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
	0.05	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
	0.1	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
	0.2	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
	0.4	-0.5%	-0.5%	-0.4%	-0.7%	-1.2%	-1.1%	-1.1%	-1.1%	-1.1%	-0.8%	-1.0%	-1.1%	-0.9%	-0.9%	-1.1%	-1.0%	-1.0%	-1.0%
	0.6	-0.6%	-0.5%	-0.5%	-1.2%	-1.2%	-1.4%	-1.0%	-1.3%	-1.3%	-0.8%	-1.1%	-1.1%	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%
	0.8	4.9%	4.7%	3.8%	3.0%	0.6%	0.8%	1.3%	-0.5%	-1.0%	-0.1%	-0.1%	-0.4%	-0.3%	0.5%	0.3%	0.0%	0.5%	0.1%
	1	5.0%	5.0%	4.8%	3.4%	1.4%	1.2%	1.4%	1.2%	1.0%	-0.2%	-0.2%	-0.2%	0.8%	0.1%	0.4%	0.1%	0.5%	0.3%
	1.2	5.4%	5.3%	4.9%	4.5%	1.9%	1.5%	1.8%	2.0%	1.2%	1.6%	0.2%	-0.2%	0.8%	0.2%	0.5%	0.2%	0.5%	0.3%
	1.4	5.5%	5.5%	4.9%	4.4%	3.0%	2.0%	2.5%	2.2%	1.7%	1.5%	0.1%	0.1%	0.8%	1.7%	0.4%	0.3%	0.5%	0.4%
	1.6	5.5%	5.4%	5.0%	4.6%	3.4%	3.1%	2.3%	2.3%	2.0%	2.5%	-0.1%	0.1%	1.0%	1.7%	0.3%	0.2%	0.4%	0.4%
	1.8	5.4%	5.2%	4.9%	4.5%	3.5%	3.2%	2.8%	2.9%	2.0%	2.8%	1.5%	-0.1%	1.2%	1.6%	1.4%	0.2%	0.3%	0.4%
	2	5.4%	5.3%	4.9%	4.4%	3.7%	3.3%	3.1%	3.0%	2.1%	2.8%	2.4%	-0.2%	1.2%	1.6%	1.5%	0.2%	0.3%	0.4%
	2.5	5.5%	5.2%	4.8%	4.3%	3.3%	3.1%	3.1%	2.8%	2.8%	2.8%	2.5%	2.2%	2.1%	1.7%	1.5%	0.7%	0.2%	0.4%
	3	5.6%	5.4%	4.9%	4.3%	3.4%	3.2%	3.2%	2.9%	2.7%	2.8%	2.6%	2.3%	2.1%	1.6%	1.5%	0.8%	0.0%	0.4%
	5	5.6%	5.4%	5.0%	4.5%	3.5%	3.3%	3.2%	3.0%	2.8%	2.9%	2.6%	2.4%	2.1%	1.8%	1.6%	0.8%	0.0%	0.5%
	10	5.6%	5.4%	5.0%	4.5%	3.5%	3.3%	3.2%	3.0%	2.8%	2.9%	2.6%	2.4%	2.1%	1.8%	1.6%	0.8%	0.0%	0.5%
	15	5.6%	5.4%	5.0%	4.5%	3.5%	3.3%	3.2%	3.0%	2.8%	2.9%	2.6%	2.4%	2.1%	1.8%	1.6%	0.8%	0.0%	0.5%

EUR/ZAR

ATR stop \ Next pyramid/entry ATR	10.2%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
	0.025	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
	0.05	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%
	0.1	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%	-2.8%
	0.2	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%	-5.9%
	0.4	-3.1%	-3.1%	-5.4%	-8.7%	-10.4%	-10.1%	-10.1%	-9.8%	-9.6%	-9.8%	-9.8%	-8.5%	-9.5%	-9.3%	-9.6%	-9.0%	-9.2%	-9.2%
	0.6	11.5%	10.7%	9.6%	7.8%	3.2%	-3.5%	2.1%	3.4%	-1.8%	-0.9%	-0.5%	-1.9%	-1.8%	-1.0%	-2.7%	-1.5%	-3.8%	-4.0%
	0.8	15.5%	14.7%	14.0%	12.6%	10.0%	8.2%	8.1%	7.5%	3.0%	1.8%	4.2%	6.1%	2.5%	1.5%	3.0%	2.3%	1.3%	0.7%
	1	16.6%	16.1%	15.4%	13.4%	11.6%	11.3%	9.5%	8.7%	8.2%	4.9%	5.4%	6.8%	6.2%	4.3%	5.2%	4.1%	2.2%	1.6%
	1.2	17.4%	17.1%	16.2%	14.3%	12.3%	11.5%	9.9%	8.3%	7.6%	7.6%	8.2%	6.3%	6.6%	2.9%	4.3%	4.4%	2.8%	2.4%
	1.4	17.5%	17.2%	16.7%	15.1%	12.6%	11.0%	9.9%	8.5%	7.9%	7.3%	7.9%	7.3%	6.5%	6.2%	5.9%	5.3%	2.9%	2.6%
	1.6	17.7%	17.4%	16.8%	15.8%	12.8%	11.0%	9.6%	8.4%	7.7%	7.8%	7.4%	8.2%	7.1%	6.3%	6.1%	5.1%	3.2%	2.6%
	1.8	17.7%	17.4%	16.9%	15.8%	13.7%	12.4%	9.6%	9.1%	8.3%	7.6%	7.3%	8.1%	7.7%	5.9%	6.0%	4.9%	3.5%	2.6%
	2	17.8%	17.5%	17.0%	15.9%	13.9%	12.3%	10.5%	9.0%	8.3%	7.8%	6.8%	8.1%	7.5%	6.2%	6.0%	4.7%	3.6%	2.6%
	2.5	17.9%	17.6%	17.1%	16.0%	14.1%	12.2%	11.1%	10.1%	9.4%	9.1%	7.6%	7.9%	7.7%	6.9%	5.9%	4.1%	3.7%	2.7%
	3	18.1%	17.8%	17.3%	16.1%	14.1%	12.6%	11.0%	10.5%	9.6%	9.0%	8.8%	8.2%	7.6%	6.8%	5.6%	4.2%	3.7%	2.7%
	5	18.1%	17.9%	17.3%	16.3%	14.4%	12.8%	11.3%	10.6%	9.8%	9.3%	9.0%	8.4%	7.9%	6.8%	5.8%	3.9%	3.8%	2.8%
	10	18.1%	17.9%	17.3%	16.3%	14.4%	12.8%	11.3%	10.6%	9.8%	9.3%	9.0%	8.4%	7.9%	6.8%	5.8%	3.9%	3.8%	2.8%
	15	18.1%	17.9%	17.3%	16.3%	14.4%	12.8%	11.3%	10.6%	9.8%	9.3%	9.0%	8.4%	7.9%	6.8%	5.8%	3.9%	3.8%	2.8%

GBP/ZAR

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
13.9%																		
0.025	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
0.05	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%
0.1	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%
0.2	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%	-6.3%
0.4	3.7%	3.6%	-1.4%	2.3%	1.1%	1.5%	-4.7%	-4.9%	-7.3%	-6.1%	-7.8%	-8.0%	-8.0%	-8.2%	-7.7%	-7.9%	-7.4%	-7.4%
0.6	11.2%	11.1%	10.5%	9.9%	6.2%	6.0%	0.2%	2.6%	-4.6%	-2.1%	-5.1%	-3.7%	-6.5%	-4.5%	-5.6%	-3.5%	-3.9%	-4.4%
0.8	16.6%	16.4%	15.5%	14.7%	12.7%	11.0%	7.9%	8.2%	7.5%	6.3%	6.9%	5.8%	2.6%	4.3%	4.0%	3.3%	1.7%	1.7%
1	17.3%	17.0%	16.5%	15.6%	14.3%	11.8%	10.6%	9.0%	8.7%	8.4%	8.7%	6.5%	6.3%	6.2%	6.5%	4.6%	3.2%	3.3%
1.2	17.7%	17.4%	16.9%	16.2%	14.7%	12.8%	11.5%	9.2%	9.4%	9.4%	8.9%	7.3%	7.6%	7.1%	6.9%	4.7%	3.6%	3.7%
1.4	18.2%	18.0%	17.6%	16.7%	15.0%	13.7%	11.1%	10.1%	9.3%	9.4%	8.7%	8.7%	7.8%	8.4%	7.7%	5.2%	4.6%	4.1%
1.6	18.3%	18.0%	17.6%	16.7%	15.2%	13.5%	12.6%	11.2%	8.9%	9.5%	9.8%	9.4%	8.4%	8.6%	7.9%	5.3%	4.7%	4.4%
1.8	18.5%	18.3%	18.0%	16.9%	15.4%	14.0%	12.9%	12.0%	10.0%	10.9%	10.1%	10.3%	10.1%	8.8%	8.7%	6.6%	5.0%	4.6%
2	18.6%	18.3%	17.9%	17.0%	15.3%	14.1%	12.9%	12.4%	11.4%	11.2%	9.9%	10.8%	10.2%	9.0%	8.8%	6.7%	4.9%	4.5%
2.5	18.6%	18.4%	18.1%	17.0%	15.2%	14.1%	13.3%	13.0%	11.8%	11.7%	10.9%	10.7%	10.2%	9.3%	8.7%	6.3%	4.9%	4.5%
3	18.6%	18.3%	18.1%	17.2%	15.5%	14.0%	13.3%	13.1%	12.3%	12.0%	11.1%	11.0%	10.5%	9.3%	8.4%	5.8%	4.9%	4.4%
5	18.6%	18.3%	18.1%	17.1%	15.6%	14.2%	13.4%	13.1%	12.3%	12.1%	11.3%	11.1%	10.6%	9.4%	8.6%	5.9%	5.0%	4.5%
10	18.6%	18.3%	18.1%	17.2%	15.6%	14.3%	13.4%	13.2%	12.3%	12.1%	11.3%	11.1%	10.6%	9.4%	8.6%	5.9%	5.0%	4.5%
15	18.6%	18.3%	18.1%	17.2%	15.6%	14.3%	13.4%	13.2%	12.3%	12.1%	11.3%	11.1%	10.6%	9.4%	8.6%	5.9%	5.0%	4.5%

NZD/ZAR

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
8.6%																		
0.025	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
0.05	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
0.1	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%
0.2	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%
0.4	-5.4%	-5.5%	-6.1%	-5.4%	-7.7%	-7.4%	-7.0%	-7.3%	-7.1%	-7.0%	-7.1%	-7.2%	-7.2%	-7.1%	-6.5%	-6.6%	-6.7%	-6.7%
0.6	10.6%	10.0%	8.8%	7.4%	2.6%	2.5%	0.5%	1.2%	1.9%	-1.7%	-2.6%	-1.0%	-2.4%	-2.1%	0.4%	-0.6%	-1.4%	-2.1%
0.8	13.0%	12.1%	11.7%	10.0%	8.1%	5.0%	4.4%	0.9%	2.1%	2.3%	-0.1%	0.3%	0.3%	-0.8%	2.5%	1.3%	0.6%	0.0%
1	14.1%	13.8%	13.3%	11.7%	9.3%	7.5%	6.1%	5.5%	4.4%	2.8%	3.9%	4.4%	3.2%	0.9%	3.3%	2.1%	1.5%	0.9%
1.2	15.6%	15.1%	14.3%	13.0%	9.7%	7.8%	7.1%	5.9%	4.9%	4.1%	5.3%	4.5%	3.4%	1.1%	3.7%	2.6%	1.9%	1.6%
1.4	15.5%	15.0%	14.3%	13.4%	10.1%	8.4%	7.5%	6.6%	5.5%	3.8%	5.2%	5.1%	4.2%	4.5%	3.8%	2.6%	1.9%	1.8%
1.6	15.7%	15.6%	14.3%	13.2%	10.9%	9.4%	7.3%	6.4%	5.6%	5.3%	5.0%	4.8%	4.8%	4.1%	3.4%	2.4%	1.7%	1.6%
1.8	16.4%	15.8%	14.7%	13.3%	11.1%	9.4%	7.5%	7.0%	5.5%	5.4%	4.9%	4.5%	4.7%	4.0%	3.7%	2.5%	2.0%	1.8%
2	16.3%	15.9%	15.1%	13.8%	11.4%	9.5%	8.9%	6.1%	6.2%	5.3%	5.2%	4.9%	4.6%	4.2%	3.7%	2.5%	2.1%	1.9%
2.5	16.4%	15.9%	15.0%	13.6%	11.1%	9.5%	8.0%	6.5%	5.0%	4.9%	4.4%	4.6%	4.6%	4.0%	3.2%	2.8%	2.4%	2.2%
3	16.5%	16.0%	15.1%	13.8%	11.1%	9.6%	7.9%	6.1%	5.0%	4.3%	4.1%	4.1%	4.6%	4.0%	3.0%	2.8%	2.4%	2.2%
5	16.5%	16.0%	15.1%	13.8%	11.1%	9.6%	8.1%	6.1%	5.8%	4.9%	4.5%	4.0%	5.1%	4.2%	3.2%	3.0%	2.4%	2.1%
10	16.5%	16.0%	15.1%	13.8%	11.1%	9.6%	8.1%	6.1%	5.8%	4.9%	4.5%	4.0%	5.1%	4.2%	3.2%	3.0%	2.4%	2.1%
15	16.5%	16.0%	15.1%	13.8%	11.1%	9.6%	8.1%	6.1%	5.8%	4.9%	4.5%	4.0%	5.1%	4.2%	3.2%	3.0%	2.4%	2.1%

TKL/ZAR

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
2.5%																		
0.025	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
0.05	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%
0.1	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%
0.2	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%	-3.2%
0.4	-2.9%	-3.3%	-3.1%	-4.2%	-5.1%	-5.0%	-4.8%	-4.6%	-4.8%	-4.5%	-4.7%	-5.1%	-5.1%	-5.1%	-5.0%	-5.0%	-5.0%	-5.0%
0.6	8.7%	7.3%	6.3%	3.6%	1.4%	2.4%	-1.3%	-2.4%	0.0%	0.1%	-0.1%	-1.9%	0.2%	-2.8%	-1.3%	-1.3%	-1.6%	-1.5%
0.8	13.8%	13.2%	11.7%	9.0%	3.4%	3.8%	1.9%	-0.4%	0.8%	0.5%	0.6%	-0.1%	2.0%	0.5%	1.4%	0.7%	0.4%	0.5%
1	14.7%	14.2%	13.3%	11.1%	7.4%	3.5%	3.7%	2.4%	2.1%	2.7%	0.8%	1.2%	2.8%	1.2%	1.5%	1.0%	0.7%	0.8%
1.2	15.8%	15.6%	14.3%	11.1%	7.9%	4.7%	2.6%	2.4%	1.5%	4.2%	1.5%	2.6%	2.6%	1.2%	1.6%	1.4%	1.1%	1.2%
1.4	15.6%	15.3%	14.4%	12.1%	6.9%	4.8%	2.3%	3.6%	0.8%	3.9%	3.0%	2.8%	3.4%	1.2%	1.4%	1.3%	1.2%	1.4%
1.6	15.9%	15.2%	14.0%	12.4%	7.4%	5.7%	3.5%	3.4%	2.0%	3.4%	2.8%	2.5%	3.9%	2.2%	1.7%	1.3%	1.4%	1.4%
1.8	16.3%	15.9%	14.2%	12.4%	7.2%	6.6%	3.5%	3.8%	3.3%	3.3%	3.0%	2.5%	3.8%	2.1%	1.7%	1.3%	1.5%	1.5%
2	16.0%	15.6%	14.4%	11.9%	8.3%	6.2%	4.4%	4.6%	4.1%	3.5%	2.8%	3.1%	3.4%	2.3%	1.8%	1.2%	1.4%	1.5%
2.5	16.0%	15.6%	14.5%	12.4%	8.7%	6.5%	4.7%	4.8%	4.6%	4.0%	2.7%	3.2%	3.2%	2.2%	1.7%	1.0%	1.4%	1.5%
3	16.2%	15.8%	14.6%	12.5%	8.8%	6.6%	5.1%	5.1%	4.7%	4.6%	2.8%	3.1%	3.5%	2.5%	1.5%	1.0%	1.6%	1.6%
5	16.2%	15.8%	14.6%	12.5%	8.8%	6.6%	5.1%	5.1%	4.7%	4.6%	3.3%	3.4%	3.5%	2.7%	1.9%	1.0%	1.6%	1.6%
10	16.2%	15.8%	14.6%	12.5%	8.8%	6.6%	5.1%	5.1%	4.7%	4.6%	3.3%	3.4%	3.5%	2.7%	1.9%	1.0%	1.6%	1.6%
15	16.2%	15.8%	14.6%	12.5%	8.8%	6.6%	5.1%	5.1%	4.7%	4.6%	3.3%	3.4%	3.5%	2.7%	1.9%	1.0%	1.6%	1.6%

USD/ZAR

		Next pyramid/entry ATR																	
	10.7%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
ATR stop	0.025	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%
	0.05	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%
	0.1	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%
	0.2	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%	-4.5%
	0.4	0.1%	0.1%	-0.2%	-0.6%	-5.4%	-7.3%	-4.0%	-7.1%	-4.9%	-7.0%	-7.0%	-5.6%	-6.7%	-6.3%	-7.2%	-7.3%	-6.8%	-6.8%
	0.6	8.2%	7.6%	7.1%	6.0%	0.4%	-3.6%	-0.7%	-1.4%	1.7%	-3.9%	-4.3%	-2.4%	-2.5%	0.6%	-2.6%	-3.5%	-2.5%	-3.0%
	0.8	13.2%	13.0%	12.7%	11.9%	9.3%	7.9%	6.0%	4.2%	3.9%	4.4%	3.0%	2.5%	3.8%	4.1%	3.3%	0.6%	2.2%	0.9%
	1	13.4%	13.3%	13.0%	12.5%	11.3%	8.7%	7.7%	6.4%	6.8%	4.2%	5.9%	6.6%	4.2%	4.1%	5.2%	2.3%	2.1%	2.0%
	1.2	13.9%	13.5%	13.3%	12.7%	11.3%	9.9%	9.6%	8.0%	7.6%	5.4%	6.7%	7.6%	7.4%	5.3%	5.8%	3.7%	2.5%	2.4%
	1.4	14.1%	13.9%	13.3%	12.7%	11.0%	11.0%	10.2%	8.8%	8.2%	7.1%	7.5%	7.5%	7.7%	5.6%	7.0%	4.9%	2.6%	2.7%
	1.6	14.3%	14.1%	13.7%	12.9%	11.6%	10.9%	10.3%	8.9%	8.7%	8.3%	7.6%	8.0%	7.6%	6.3%	7.1%	4.9%	3.3%	2.7%
	1.8	14.3%	14.0%	13.6%	12.9%	11.7%	10.8%	10.6%	10.0%	9.4%	9.2%	7.5%	8.3%	8.0%	6.3%	7.2%	5.0%	3.6%	2.8%
	2	14.5%	14.3%	13.7%	12.9%	11.9%	11.0%	10.9%	10.1%	9.8%	9.6%	9.2%	8.4%	7.9%	7.2%	7.2%	5.0%	3.6%	2.9%
	2.5	14.6%	14.4%	13.9%	13.2%	12.0%	11.3%	11.0%	10.5%	10.4%	10.1%	9.4%	9.2%	8.9%	7.9%	7.5%	5.5%	3.6%	2.9%
	3	14.6%	14.4%	14.0%	13.3%	12.2%	11.6%	11.1%	10.7%	10.4%	10.1%	9.8%	9.1%	9.0%	8.2%	7.6%	5.5%	3.6%	3.0%
	5	14.6%	14.4%	14.0%	13.3%	12.3%	11.7%	11.3%	10.9%	10.7%	10.3%	9.9%	9.5%	9.3%	8.4%	7.9%	5.6%	3.7%	3.0%
	10	14.6%	14.4%	14.0%	13.3%	12.3%	11.7%	11.3%	10.9%	10.7%	10.3%	9.9%	9.5%	9.3%	8.4%	7.9%	5.6%	3.7%	3.0%
	15	14.6%	14.4%	14.0%	13.3%	12.3%	11.7%	11.3%	10.9%	10.7%	10.3%	9.9%	9.5%	9.3%	8.4%	7.9%	5.6%	3.7%	3.0%

ZAR/JPY

		Next pyramid/entry ATR																	
	6.7%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
ATR stop	0.025	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%
	0.05	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%
	0.1	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%
	0.2	-6.6%	-6.6%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
	0.4	-1.7%	-1.7%	-3.6%	-5.3%	-9.0%	-10.7%	-10.9%	-12.5%	-11.9%	-10.6%	-10.3%	-9.1%	-10.2%	-10.8%	-10.8%	-10.6%	-9.8%	-9.6%
	0.6	14.1%	12.7%	11.6%	9.0%	6.1%	1.6%	2.7%	-4.7%	-2.9%	-6.5%	-5.5%	-3.4%	-3.0%	-4.0%	-4.0%	-5.1%	-4.8%	-4.8%
	0.8	17.5%	17.3%	15.9%	13.7%	1.4%	3.7%	3.9%	0.2%	-3.4%	-5.4%	-4.8%	-2.7%	0.8%	2.1%	-0.8%	-0.9%	-0.7%	-0.8%
	1	20.3%	19.7%	18.7%	16.5%	9.8%	8.6%	8.4%	3.9%	3.4%	1.3%	1.2%	0.8%	2.2%	4.8%	4.3%	3.2%	2.3%	2.1%
	1.2	20.7%	20.1%	19.3%	16.6%	10.5%	8.1%	7.5%	8.1%	3.0%	4.0%	2.1%	2.3%	3.8%	2.2%	5.1%	2.3%	2.6%	2.4%
	1.4	20.9%	20.7%	19.9%	17.6%	15.2%	9.2%	7.9%	8.5%	8.3%	6.2%	5.2%	6.0%	3.6%	2.7%	5.7%	4.0%	3.3%	3.5%
	1.6	20.9%	20.6%	19.9%	17.9%	15.6%	9.5%	7.3%	8.5%	8.0%	5.5%	6.3%	5.9%	4.6%	2.1%	4.7%	4.3%	3.4%	3.6%
	1.8	22.0%	21.5%	20.9%	18.5%	15.6%	12.3%	10.3%	8.3%	8.3%	6.8%	6.7%	7.4%	5.6%	6.0%	5.4%	4.5%	3.7%	3.8%
	2	22.0%	21.7%	21.0%	19.3%	16.4%	12.9%	11.5%	9.1%	7.9%	11.4%	7.7%	7.8%	5.5%	8.4%	7.6%	5.2%	4.1%	4.0%
	2.5	22.1%	21.8%	21.2%	19.6%	17.3%	14.6%	12.4%	11.9%	11.1%	11.3%	9.9%	10.2%	5.7%	8.0%	7.3%	4.9%	4.1%	4.0%
	3	22.2%	21.9%	21.2%	19.5%	17.2%	14.9%	13.5%	12.2%	11.6%	12.1%	11.1%	10.4%	9.0%	8.1%	7.3%	5.1%	4.1%	3.9%
	5	22.2%	21.8%	21.2%	19.7%	17.3%	15.0%	13.7%	12.5%	11.8%	12.3%	11.2%	10.4%	9.2%	8.5%	7.6%	5.2%	4.1%	3.7%
	10	22.2%	21.9%	21.2%	19.7%	17.3%	15.1%	13.8%	12.6%	11.9%	12.3%	11.2%	10.5%	9.3%	8.6%	7.7%	5.3%	4.2%	3.8%
	15	22.2%	21.9%	21.2%	19.7%	17.3%	15.1%	13.8%	12.6%	11.9%	12.3%	11.2%	10.5%	9.3%	8.6%	7.7%	5.3%	4.2%	3.8%

Energy

Brent Crude

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
19.7%																		
0.025	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%
0.05	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%
0.1	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%	-12.3%
0.2																		
0.4	-3.9%	-4.8%	-5.6%	-8.1%														
0.6	24.6%	24.1%	22.1%	21.4%	3.7%	4.7%	5.9%	-0.5%	-8.7%	-1.3%	0.0%	0.4%	-0.7%	-4.7%	-2.1%	-5.1%	-4.3%	-3.0%
0.8	26.5%	26.2%	25.2%	23.9%	20.8%	11.9%	12.8%	5.6%	5.5%	-1.9%	2.2%	-1.8%	1.2%	-2.2%	-1.9%	-1.0%	0.3%	0.8%
1	26.7%	26.5%	26.2%	24.0%	21.8%	17.1%	14.9%	12.3%	11.4%	2.6%	6.1%	6.8%	4.4%	3.3%	1.4%	1.6%	1.7%	2.2%
1.2	26.8%	26.7%	26.5%	26.1%	23.9%	18.8%	17.5%	14.8%	14.5%	5.1%	6.4%	11.0%	8.5%	1.1%	5.2%	0.6%	2.2%	2.5%
1.4	27.0%	26.5%	26.1%	25.4%	24.0%	20.3%	17.0%	14.9%	13.6%	6.5%	7.1%	10.0%	9.5%	0.7%	4.4%	2.1%	2.9%	2.9%
1.6	26.9%	26.7%	26.4%	25.6%	23.6%	21.9%	18.3%	12.3%	13.4%	9.8%	10.4%	9.8%	6.8%	0.0%	3.1%	3.0%	4.1%	3.3%
1.8	27.1%	26.7%	26.4%	25.4%	24.3%	21.5%	19.1%	12.2%	11.8%	10.1%	9.6%	7.8%	7.9%	4.7%	5.7%	3.2%	4.0%	3.0%
2	27.5%	27.3%	26.7%	25.4%	24.3%	22.1%	19.0%	11.6%	10.3%	11.1%	9.1%	11.3%	7.8%	6.1%	5.4%	3.8%	4.7%	3.6%
2.5	27.4%	27.2%	26.8%	25.7%	24.6%	23.2%	21.0%	15.6%	13.4%	10.8%	9.1%	8.5%	7.7%	5.3%	4.7%	4.9%	4.7%	3.6%
3	27.5%	27.2%	26.9%	25.6%	24.7%	23.2%	20.9%	16.8%	12.1%	11.4%	9.6%	8.3%	6.5%	6.7%	6.0%	4.5%	4.7%	3.6%
5	27.5%	27.2%	26.9%	25.7%	24.7%	23.3%	20.7%	16.8%	13.1%	11.4%	10.1%	8.6%	6.9%	6.7%	5.9%	4.2%	4.8%	3.7%
10	27.5%	27.2%	26.9%	25.7%	24.7%	23.3%	20.7%	16.8%	13.1%	11.4%	10.1%	8.6%	6.9%	6.8%	5.9%	4.2%	4.8%	3.7%
15	27.5%	27.2%	26.9%	25.7%	24.7%	23.3%	20.7%	16.8%	13.1%	11.4%	10.1%	8.6%	6.9%	6.8%	5.9%	4.2%	4.8%	3.7%

Gasoline

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
38.5%																		
0.025	12.9%	12.8%	12.6%	12.3%	3.1%	3.0%	2.1%	1.4%	1.5%	1.9%	2.3%	2.2%	2.5%	1.2%	1.7%	0.5%	0.8%	0.7%
0.05	11.9%	11.8%	11.7%	11.3%	2.1%	2.1%	1.2%	0.4%	0.5%	0.9%	1.3%	1.2%	1.6%	0.3%	0.8%	-0.4%	0.0%	-0.2%
0.1	9.9%	9.9%	9.7%	9.4%	0.2%	0.1%	-0.7%	-1.4%	-1.3%	-0.9%	-0.5%	-0.6%	-0.4%	-1.5%	-0.9%	-2.1%	-1.7%	-1.9%
0.2	6.3%	6.2%	6.1%	5.7%	-3.6%	-3.7%	-4.5%	-5.3%	-5.2%	-4.7%	-4.3%	-4.4%	-4.1%	-5.2%	-4.7%	-4.3%	-5.2%	-5.3%
0.4	8.3%	8.6%	5.9%	-3.0%	-12.2%	-10.7%	-10.3%	-11.5%	-9.8%	-9.6%	-9.2%	-9.0%	-8.6%	-6.4%	-6.8%	-6.5%	-7.2%	-7.2%
0.6	39.1%	38.9%	36.9%	31.4%	12.7%	1.1%	2.6%	3.7%	3.2%	-4.0%	-4.0%	4.9%	0.7%	3.3%	4.7%	0.3%	-1.6%	-1.6%
0.8	52.3%	52.3%	52.0%	50.0%	41.8%	36.4%	20.7%	25.8%	15.1%	5.6%	5.6%	10.3%	8.0%	3.7%	7.6%	2.5%	3.2%	3.4%
1	53.9%	53.9%	53.2%	52.6%	44.8%	42.4%	19.7%	23.7%	10.5%	16.9%	3.4%	16.3%	10.5%	3.3%	7.7%	2.9%	4.5%	4.9%
1.2	54.5%	54.1%	53.2%	52.1%	47.4%	44.0%	32.7%	35.8%	32.1%	13.4%	5.6%	14.2%	11.2%	3.0%	5.3%	2.5%	4.3%	5.0%
1.4	55.0%	53.5%	52.3%	51.7%	47.3%	43.4%	39.1%	35.5%	34.2%	15.8%	7.5%	7.6%	11.3%	5.6%	4.1%	3.7%	4.3%	5.1%
1.6	55.9%	55.8%	54.0%	51.9%	49.4%	43.8%	40.3%	35.4%	32.9%	14.0%	13.6%	13.6%	9.7%	6.5%	4.3%	4.4%	4.7%	5.9%
1.8	56.0%	55.0%	53.4%	52.0%	49.4%	43.4%	39.4%	35.0%	30.9%	25.4%	11.1%	12.8%	9.8%	6.8%	3.7%	4.0%	4.5%	5.9%
2	56.4%	55.4%	53.2%	51.7%	49.6%	44.5%	39.3%	31.2%	28.0%	25.0%	11.1%	12.4%	10.9%	4.5%	5.2%	3.8%	4.5%	6.2%
2.5	56.5%	55.7%	53.8%	51.6%	49.4%	46.5%	39.3%	32.2%	33.6%	23.3%	23.8%	16.1%	11.4%	8.3%	6.9%	7.3%	4.9%	6.8%
3	57.5%	56.7%	54.8%	52.2%	49.7%	45.9%	42.1%	30.2%	35.6%	31.5%	23.9%	24.8%	9.2%	18.1%	5.5%	7.8%	5.3%	7.2%
5	57.5%	56.7%	54.8%	52.8%	50.4%	46.7%	42.8%	38.8%	35.6%	31.7%	29.1%	25.4%	20.2%	18.1%	10.8%	8.0%	5.5%	7.2%
10	57.5%	56.7%	54.8%	52.8%	50.4%	46.7%	42.8%	38.8%	35.6%	31.7%	29.1%	25.4%	20.2%	18.1%	10.8%	8.0%	5.5%	7.2%
15	57.5%	56.7%	54.8%	52.8%	50.4%	46.7%	42.8%	38.8%	35.6%	31.7%	29.1%	25.4%	20.2%	18.1%	10.8%	8.0%	5.5%	7.2%

Heating Oil

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
7.2%																		
0.025	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
0.05	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%
0.1	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%
0.2	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%	-7.1%
0.4	4.0%	3.1%	0.0%	-5.4%	-7.5%	-7.4%	-6.7%	-9.9%	-9.2%	-9.3%	-9.1%	-8.7%	-5.6%	-10.3%	-9.7%	-7.6%	-8.0%	-8.0%
0.6	20.0%	9.1%	6.9%	2.8%	-3.5%	-1.5%	-2.4%	-6.0%	-7.4%	-5.6%	-6.2%	-5.9%	-2.9%	-6.0%	-5.5%	-4.0%	-3.8%	-3.8%
0.8	38.5%	35.8%	12.9%	10.9%	8.2%	5.8%	2.0%	5.2%	3.1%	0.8%	-1.0%	3.0%	0.3%	-1.9%	0.4%	-1.6%	-0.1%	0.2%
1	38.9%	38.2%	37.7%	21.1%	7.0%	4.7%	7.1%	1.4%	6.1%	-1.2%	1.0%	2.8%	2.0%	0.2%	1.1%	-1.7%	0.7%	0.9%
1.2	37.2%	36.3%	34.3%	34.6%	13.4%	1.8%	5.0%	1.3%	4.6%	2.9%	-1.7%	1.8%	2.5%	0.6%	0.2%	-1.8%	0.7%	0.8%
1.4	36.9%	35.7%	34.1%	31.1%	11.1%	8.5%	2.2%	1.2%	-0.2%	0.4%	-1.5%	-3.1%	0.3%	0.4%	-0.5%	-1.7%	0.5%	0.6%
1.6	38.0%	37.0%	34.4%	33.4%	20.5%	9.4%	4.6%	2.6%	1.2%	0.1%	-2.1%	-3.2%	-0.2%	1.2%	-0.4%	-1.1%	0.5%	0.6%
1.8	37.8%	37.1%	34.8%	31.2%	19.1%	11.2%	7.5%	0.5%	0.6%	0.0%	-0.5%	-2.2%	-0.8%	0.3%	-0.8%	-1.7%	-0.1%	0.4%
2	37.8%	36.4%	34.2%	29.3%	17.6%	6.9%	5.9%	2.7%	1.8%	1.0%	-0.6%	-0.4%	-1.4%	-0.5%	-1.1%	-2.0%	-0.2%	-0.1%
2.5	39.1%	38.3%	36.4%	30.4%	17.3%	6.2%	5.8%	0.7%	1.9%	1.5%	-1.1%	-1.9%	-2.8%	0.6%	-2.0%	-1.7%	0.6%	0.6%
3	39.0%	38.2%	36.2%	33.4%	19.9%	9.5%	6.1%	2.3%	2.7%	2.8%	0.4%	-0.9%	-2.8%	0.2%	-2.1%	-1.2%	0.8%	1.0%
5	39.3%	38.4%	36.3%	33.6%	20.7%	10.6%	8.3%	2.9%	3.3%	3.2%	0.8%	-0.6%	-1.8%	0.6%	-1.6%	-0.3%	1.0%	1.1%
10	39.3%	38.4%	36.3%	33.6%	20.7%	10.6%	8.3%	2.9%	3.3%	3.2%	0.8%	-0.6%	-1.8%	0.6%	-1.6%	-0.3%	1.0%	1.1%
15	39.3%	38.4%	36.3%	33.6%	20.7%	10.6%	8.3%	2.9%	3.3%	3.2%	0.8%	-0.6%	-1.8%	0.6%	-1.6%	-0.3%	1.0%	1.1%

Natural Gas

ATR stop	Next pyramid/entry ATR																	
41.7%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%	-3.1%
0.05	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%
0.1	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%	-20.4%
0.2	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%	-68.1%
0.4	28.3%	28.1%	27.6%	25.8%	8.6%	7.9%	4.2%	-0.6%		-16.3%		-30.8%	-58.4%	-21.2%		-55.0%		
0.6	54.2%	52.8%	51.1%	46.2%	35.2%	26.8%	19.5%	16.4%	8.6%	7.9%	-0.2%	-3.2%	-5.5%	5.2%	0.1%	-0.9%	-1.0%	-0.9%
0.8	62.3%	61.6%	52.6%	47.2%	44.9%	38.2%	30.4%	26.5%	17.6%	20.5%	17.2%	16.9%	17.7%	16.5%	9.1%	8.9%	3.9%	6.1%
1	58.7%	58.2%	57.2%	48.4%	43.8%	36.4%	35.7%	28.6%	31.3%	23.4%	16.8%	18.1%	19.4%	16.2%	11.0%	10.3%	6.5%	8.7%
1.2	57.6%	56.9%	48.8%	45.7%	40.9%	34.8%	32.7%	21.1%	26.6%	21.7%	16.9%	18.8%	17.4%	12.2%	8.7%	8.5%	6.9%	8.1%
1.4	58.8%	59.0%	55.0%	44.3%	40.5%	38.9%	34.2%	18.4%	24.2%	24.3%	16.6%	16.3%	14.5%	9.6%	5.7%	6.7%	3.9%	5.9%
1.6	59.4%	59.8%	52.1%	46.7%	40.1%	37.2%	32.6%	29.1%	20.7%	20.6%	16.0%		14.9%	9.0%	11.3%	5.6%	3.2%	5.7%
1.8	61.3%	60.0%	49.7%	48.8%	37.7%	34.7%	30.4%	30.4%	20.3%	22.2%	18.5%	15.7%	21.3%	9.1%	12.2%	7.1%	5.5%	7.4%
2	61.5%	61.2%	53.4%	49.0%	35.6%	35.7%	27.1%	29.0%	24.8%	21.1%	18.3%	15.2%	20.3%	8.2%	11.8%	7.5%	5.1%	6.9%
2.5	61.7%	61.2%	55.4%	49.0%	43.1%	35.7%	28.0%	27.3%	25.8%	19.0%	16.1%	19.0%	20.1%	8.2%	11.7%	7.7%	5.7%	7.4%
3	62.4%	61.3%	59.8%	49.8%	44.5%	37.6%	31.4%	30.1%	23.9%	21.5%	15.7%	17.5%	19.7%	8.6%	12.5%	8.0%	6.4%	8.0%
5	62.5%	61.4%	59.4%	50.0%	45.8%	39.0%	33.9%	29.8%	27.1%	21.1%	18.7%	19.3%	20.8%	8.5%	13.0%	7.8%	6.8%	8.2%
10	62.5%	61.4%	59.4%	50.0%	45.8%	39.0%	33.9%	29.8%	27.1%	21.1%	18.7%	19.3%	20.8%	8.5%	13.0%	7.8%	6.8%	8.2%
15	62.5%	61.4%	59.4%	50.0%	45.8%	39.0%	33.9%	29.8%	27.1%	21.1%	18.7%	19.3%	20.8%	8.5%	13.0%	7.8%	6.8%	8.2%

WTIA Crude Oil

ATR stop	Next pyramid/entry ATR																	
21.3%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%
0.05	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%
0.1	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%	-13.8%
0.2																		
0.4	19.7%	11.6%	1.2%								-38.8%							
0.6	26.9%	26.7%	23.5%	23.1%					-49.2%					-16.7%		-25.4%	-19.7%	-19.7%
0.8	30.4%	30.1%	29.7%	28.8%	16.1%	7.0%	-1.9%	13.1%	8.1%	5.5%		-18.1%	-11.5%	-7.5%	-3.0%	-6.6%	-3.3%	-3.3%
1	47.8%	41.2%	35.1%	30.5%	23.8%	16.6%	22.8%	18.9%	19.1%	-30.6%	10.6%	-4.9%	-7.3%	2.4%	5.5%	-1.2%	3.1%	3.1%
1.2	53.1%	44.4%	39.0%	27.6%	22.5%	18.7%	19.6%	20.0%	15.8%	10.4%	5.2%	-15.2%	6.6%	4.4%	7.9%	-2.1%	3.6%	3.6%
1.4	58.0%	50.4%	41.9%	28.7%	25.4%	18.8%	22.6%	18.9%	20.3%	15.5%	4.2%	10.2%	15.0%	2.3%	8.9%	-0.9%	6.0%	6.8%
1.6	62.2%	58.4%	49.7%	33.8%	29.0%	23.5%	26.0%	14.6%	22.6%	17.6%	1.3%	11.1%	16.0%	0.2%	10.5%	1.6%	7.0%	7.9%
1.8	63.1%	61.3%	53.1%	35.4%	28.3%	21.1%	27.2%	19.2%	22.1%	19.5%	12.1%	9.2%	15.3%	6.1%	11.8%	6.8%	7.6%	8.7%
2	62.3%	61.0%	52.7%	36.2%	27.4%	23.4%	25.9%	20.1%	21.2%	20.0%	16.0%	9.7%	16.2%	9.2%	12.7%	6.9%	7.7%	9.0%
2.5	62.7%	60.4%	52.7%	36.3%	30.6%	24.1%	24.0%	21.5%	22.1%	20.7%	15.9%	16.2%	16.9%	7.0%	13.0%	7.9%	7.9%	8.9%
3	61.8%	59.6%	52.5%	38.0%	30.1%	24.6%	24.8%	21.3%	21.9%	20.5%	16.5%	16.2%	17.2%	6.0%	12.4%	7.8%	7.8%	8.8%
5	64.5%	62.3%	57.5%	41.1%	28.9%	22.4%	23.6%	19.4%	20.0%	18.1%	14.4%	14.5%	15.6%	3.2%	9.8%	8.5%	8.4%	9.5%
10	64.5%	62.3%	57.5%	41.1%	30.3%	24.5%	23.9%	20.7%	21.2%	19.2%	16.3%	16.2%	17.0%	5.0%	10.6%	8.5%	8.4%	9.5%
15	64.5%	62.3%	57.5%	41.1%	30.3%	24.5%	23.9%	20.7%	21.2%	19.2%	16.3%	16.2%	17.0%	5.0%	10.6%	8.5%	8.4%	9.5%

Equity Indices

African Banks

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
20.9%																		
0.025	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
0.05	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%
0.1	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%
0.2	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%
0.4	-4.2%	-5.6%	-5.4%	-6.6%	-9.4%	-31.5%	-21.9%	-21.6%	-18.4%	-17.1%	-21.5%	-18.3%	-20.9%	-22.2%	-22.4%	-22.0%	-19.6%	-19.6%
0.6	21.5%	21.6%	20.9%	17.1%	9.4%	6.1%	3.6%	-8.0%	-10.5%	-3.5%	-12.9%	-12.0%	-4.8%	-10.2%	-6.5%	-8.9%	-7.3%	-7.2%
0.8	26.6%	26.7%	25.0%	23.1%	17.1%	1.8%	5.1%	8.0%	4.7%	-4.7%	-2.5%	-10.4%	-5.2%	-8.0%	-5.8%	-3.4%	-2.5%	-2.5%
1	32.2%	31.7%	29.1%	27.4%	18.4%	19.4%	10.8%	9.7%	6.4%	-2.0%	5.7%	-7.4%	-4.4%	-3.6%	2.4%	1.8%	1.4%	1.5%
1.2	31.9%	31.5%	31.3%	28.7%	24.3%	19.7%	10.4%	12.2%	8.1%	-9.8%	2.7%	0.3%	4.1%	-1.1%	1.8%	1.2%	2.1%	2.2%
1.4	32.7%	31.9%	29.6%	26.0%	20.6%	14.2%	11.6%	8.9%	5.4%	-0.1%	3.9%	0.8%	-0.5%	-1.8%	0.7%	1.6%	1.9%	2.1%
1.6	32.8%	30.4%	28.8%	26.3%	18.0%	11.3%	12.6%	1.7%	6.5%	1.7%	0.2%	-3.2%	-2.6%	0.0%	-0.8%	0.6%	1.8%	2.1%
1.8	33.3%	30.5%	29.1%	25.2%	18.9%	17.8%	8.4%	1.3%	3.8%	-1.4%	-2.5%	0.6%	-1.7%	0.9%	-2.2%	0.6%	1.4%	2.1%
2	33.2%	32.1%	30.4%	26.2%	19.1%	9.9%	5.3%	0.3%	1.5%	1.8%	-6.1%	-4.2%	-2.8%	-1.1%	-0.7%	1.9%	1.8%	2.5%
2.5	34.1%	33.4%	31.3%	26.9%	22.2%	16.4%	8.9%	1.7%	2.5%	3.6%	-4.8%	2.9%	-2.2%	1.3%	1.4%	1.8%	2.0%	2.6%
3	33.8%	33.3%	30.3%	27.6%	21.7%	17.9%	14.9%	8.3%	8.0%	8.5%	4.4%	3.3%	3.4%	3.4%	2.8%	1.9%	2.8%	3.1%
5	33.9%	33.3%	31.3%	28.0%	23.5%	20.4%	18.5%	14.3%	15.5%	12.3%	10.3%	7.0%	7.6%	5.1%	4.9%	2.6%	2.8%	3.5%
10	33.9%	33.3%	31.3%	28.0%	23.5%	20.4%	18.5%	14.3%	15.5%	12.3%	10.3%	7.0%	7.6%	5.1%	4.9%	2.6%	2.8%	3.5%
15	33.9%	33.3%	31.3%	28.0%	23.5%	20.4%	18.5%	14.3%	15.5%	12.3%	10.3%	7.0%	7.6%	5.1%	4.9%	2.6%	2.8%	3.5%

ALSI

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
45.5%																		
0.025	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%	-4.8%
0.05	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%	-13.1%
0.1																		
0.2	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%	-48.5%
0.4	21.2%	19.8%	15.7%	6.9%	2.5%	-40.9%	-46.6%	-40.5%		-54.3%	-37.5%			-39.3%	-38.1%	-40.0%		
0.6	59.6%	58.3%	57.5%	36.2%	16.2%	-47.9%		13.0%	-0.6%	13.1%	1.6%	13.1%	3.9%	-34.6%		3.9%	-12.8%	-6.3%
0.8	61.3%	60.6%	60.9%	54.9%	40.6%	21.6%	11.3%	17.1%	12.7%	13.2%	6.9%	9.6%	4.0%	-10.5%	5.5%	8.3%	-1.8%	2.2%
1	64.0%	62.2%	60.8%	59.9%	45.9%	39.2%	18.5%	13.7%	16.0%	6.8%	11.1%	15.1%	4.6%	4.8%	5.7%	8.6%	3.1%	6.0%
1.2	62.8%	62.0%	60.0%	57.1%	41.5%	32.0%	30.5%	13.0%	19.1%	13.3%	1.3%	14.7%	11.0%	5.3%	6.1%	10.6%	5.5%	7.7%
1.4	63.8%	61.0%	59.6%	54.2%	44.1%	33.7%	29.3%	17.3%	15.4%	17.7%	5.7%	7.3%	19.8%	-1.8%	6.2%	6.2%	5.4%	7.8%
1.6	64.9%	64.4%	61.1%	56.4%	51.0%	31.2%	28.4%	18.7%	17.8%	17.9%	-4.2%	-4.1%	20.2%	2.6%	6.2%	4.2%	7.4%	9.7%
1.8	66.1%	65.1%	63.0%	56.0%	46.4%	38.8%	30.7%	19.5%	16.5%	14.5%	4.4%		18.5%	16.0%	7.1%	3.0%	9.2%	10.2%
2	66.0%	65.5%	63.8%	58.1%	45.7%	33.6%	28.8%	18.7%	12.8%	23.1%	1.5%		15.1%	14.7%	2.4%	2.1%	9.6%	10.2%
2.5	66.8%	66.3%	64.8%	61.4%	50.0%	48.5%	23.9%	30.6%	13.0%	24.2%	18.9%		12.0%	15.3%	9.9%	4.8%	11.1%	11.6%
3	67.6%	66.4%	64.8%	61.4%	56.2%	54.7%	41.5%	32.3%	30.1%	28.7%	21.5%	13.9%	12.5%	16.9%	12.1%	9.1%	11.5%	12.2%
5	67.6%	67.0%	65.5%	62.1%	57.2%	55.8%	46.2%	38.5%	32.4%	30.1%	27.4%	17.5%	15.0%	19.2%	13.4%	9.5%	11.6%	12.4%
10	67.6%	67.0%	65.5%	62.1%	57.2%	55.8%	46.2%	38.5%	32.4%	30.1%	27.4%	17.5%	15.0%	19.2%	13.4%	9.5%	11.6%	12.4%
15	67.6%	67.0%	65.5%	62.1%	57.2%	55.8%	46.2%	38.5%	32.4%	30.1%	27.4%	17.5%	15.0%	19.2%	13.4%	9.5%	11.6%	12.4%

Capped Top40

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
11.9%																		
0.025	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%
0.05	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%
0.1	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%	-13.2%
0.2	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%	-54.4%
0.4	5.2%	2.9%	2.9%		-44.3%		-54.8%		-47.4%	-53.0%	-55.2%	-51.2%				-55.2%		
0.6	27.7%	27.6%	23.1%	10.1%	3.5%		4.4%	-13.0%	-14.5%	-14.3%		-14.5%	-7.5%	-24.5%	-20.2%	-17.8%	-16.0%	-16.0%
0.8	30.0%	30.1%	30.7%	18.8%	10.9%	-5.9%	3.4%	-3.7%	-3.6%	-0.8%	-3.8%	-5.3%	-2.2%	-28.2%	-13.0%	-9.5%	-9.7%	-9.7%
1	25.5%	25.1%	25.3%	22.2%	16.1%	11.9%	3.4%	-8.3%		-1.0%	-3.2%	-5.7%	-4.5%	-48.5%	-17.3%	-9.2%	-5.8%	-5.8%
1.2	42.7%	39.5%	28.8%	25.9%	16.0%	13.6%	9.5%	-11.5%	-2.7%	-8.5%	-12.8%	-6.4%	-6.4%	-4.5%	-16.3%	-1.1%	-1.1%	0.3%
1.4	52.9%	50.3%	45.0%	28.5%	14.1%	14.5%	10.0%	-9.8%	-1.6%		-22.4%	-7.6%	-17.1%	-7.6%	-17.3%	-0.8%	-1.0%	0.4%
1.6	53.5%	51.8%	44.2%	27.5%	13.1%	8.8%	-3.1%	-4.5%	-32.7%			-36.8%		-29.5%	-13.4%	-2.6%	-0.9%	0.9%
1.8	51.2%	50.3%	34.1%	27.0%	17.8%	9.7%	-22.4%	-20.5%	-34.5%	-4.5%	-31.7%				-26.4%	-6.0%	-1.7%	0.6%
2	53.5%	53.2%	33.2%	28.7%	15.6%	6.1%	-3.3%	-11.4%		-3.6%	-0.9%		-39.3%	-34.1%	-11.2%	-4.3%	0.2%	3.0%
2.5	56.6%	55.9%	53.1%	41.9%	16.4%	19.3%	-30.1%	11.4%	-14.7%		-1.3%	-11.0%	-5.6%		-13.0%	-2.8%	2.3%	4.3%
3	59.0%	57.9%	55.4%	49.3%	31.0%	21.7%	12.0%	16.2%	4.3%	5.3%	0.0%	-12.0%	-6.2%	-4.0%	-6.5%	0.0%	2.5%	4.7%
5	59.2%	58.0%	55.5%	49.8%	31.4%	30.7%	17.6%	18.3%	11.6%	10.7%	4.5%	-8.2%	2.9%	2.2%	-3.7%	1.4%	3.1%	5.2%
10	59.2%	58.0%	55.5%	49.8%	31.4%	30.7%	17.6%	18.3%	11.6%	10.7%	4.5%	-8.2%	2.9%	2.2%	-3.7%	1.4%	3.1%	5.2%
15	59.2%	58.0%	55.5%	49.8%	31.4%	30.7%	17.6%	18.3%	11.6%	10.7%	4.5%	-8.2%	2.9%	2.2%	-3.7%	1.4%	3.1%	5.2%

DiviPlus

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
2.4%																		
0.025	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
0.05	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
0.1	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
0.2	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%
0.4	1.5%	1.5%	1.5%	1.3%	-0.6%	-0.6%	-0.5%	-0.2%	-0.9%	-0.7%	-1.0%	-0.4%	-0.3%	-0.7%	-0.3%	-0.6%	-0.8%	-0.7%
0.6	2.6%	1.9%	2.1%	2.1%	1.5%	1.6%	0.9%	1.2%	0.4%	0.5%	-0.2%	0.1%	-0.1%	0.3%	-0.1%	-0.3%	-0.5%	-0.4%
0.8	4.7%	3.9%	3.5%	2.8%	2.9%	1.5%	1.4%	1.6%	1.3%	0.4%	0.4%	0.5%	0.8%	0.4%	0.5%	0.0%	-0.2%	-0.1%
1	6.8%	6.7%	6.3%	5.1%	4.0%	1.7%	1.7%	1.5%	1.0%	1.4%	0.6%	0.6%	1.0%	0.5%	0.8%	0.4%	0.3%	0.4%
1.2	7.2%	6.9%	6.1%	5.3%	4.0%	2.0%	1.6%	1.4%	0.9%	1.6%	1.9%	0.1%	0.8%	0.4%	0.8%	0.4%	0.5%	0.5%
1.4	7.7%	7.3%	6.7%	5.6%	4.0%	2.0%	1.2%	0.9%	0.5%	1.2%	1.4%	0.9%	0.6%	0.8%	0.7%	0.3%	0.4%	0.5%
1.6	7.8%	7.7%	7.3%	6.3%	3.8%	3.0%	1.7%	1.0%	0.4%	1.1%	1.1%	0.6%	1.2%	0.5%	0.6%	0.3%	0.6%	0.6%
1.8	7.6%	7.5%	7.3%	6.5%	4.1%	3.5%	1.5%	1.0%	0.7%	0.8%	0.9%	0.3%	1.2%	0.3%	0.6%	0.4%	0.5%	0.6%
2	7.5%	7.4%	7.0%	6.4%	4.7%	4.0%	2.8%	1.0%	1.9%	1.1%	0.7%	0.8%	1.1%	0.1%	0.5%	0.4%	0.5%	0.6%
2.5	7.8%	7.5%	7.2%	6.6%	5.2%	3.7%	2.9%	0.7%	1.6%	1.4%	1.2%	0.8%	1.2%	0.3%	0.7%	0.2%	0.5%	0.5%
3	7.8%	7.6%	7.3%	6.6%	5.2%	3.9%	3.2%	2.3%	2.1%	1.5%	1.2%	1.1%	1.3%	0.6%	0.7%	0.4%	0.6%	0.7%
5	7.8%	7.6%	7.3%	6.6%	5.3%	4.0%	3.4%	2.4%	2.2%	1.8%	1.5%	1.1%	1.6%	0.8%	0.8%	0.5%	0.6%	0.7%
10	7.8%	7.6%	7.3%	6.6%	5.3%	4.0%	3.4%	2.4%	2.2%	1.8%	1.5%	1.1%	1.6%	0.8%	0.8%	0.5%	0.6%	0.7%
15	7.8%	7.6%	7.3%	6.6%	5.3%	4.0%	3.4%	2.4%	2.2%	1.8%	1.5%	1.1%	1.6%	0.8%	0.8%	0.5%	0.6%	0.7%

FIN15

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
16.1%																		
0.025	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%	-1.4%
0.05	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%	-2.9%
0.1	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%	-6.6%
0.2	-18.9%	-19.1%	-19.5%	-23.2%	-21.7%	-21.2%	-22.1%	-23.2%	-21.2%	-22.7%	-22.7%	-22.5%	-22.4%	-22.7%	-22.7%	-22.7%	-22.7%	-22.7%
0.4	2.3%	2.4%	0.7%	1.2%	-32.7%	-26.9%		-50.5%	-50.5%			-49.7%	-49.8%		-50.7%	-50.4%		
0.6	30.3%	27.5%	26.9%	21.2%	9.2%	17.6%	5.6%	-2.0%	-2.6%	-34.7%	-4.4%	-9.9%	-17.2%	-13.1%	-15.6%	-16.6%	-17.7%	-18.6%
0.8	42.1%	41.7%	40.9%	35.9%	20.7%	21.4%	21.4%	11.8%	7.7%	2.3%	-1.7%	6.9%	1.3%	-7.4%	-5.7%	-4.7%	-3.5%	-3.0%
1	42.5%	42.2%	41.2%	35.2%	29.9%	13.8%	16.2%	16.2%	4.7%	10.2%	4.8%	6.6%	6.9%	-2.9%	-0.2%	2.1%	1.7%	2.3%
1.2	43.8%	43.0%	42.0%	40.9%	38.2%	17.6%	19.9%	15.1%	15.1%	11.2%	-0.9%	11.8%	7.9%	-2.9%	0.9%	6.2%	2.5%	3.0%
1.4	43.2%	43.0%	41.9%	38.5%	35.8%	16.1%	18.7%	13.2%	10.8%	8.5%	9.0%	14.7%	11.4%	2.5%	4.5%	4.9%	3.2%	3.1%
1.6	42.3%	41.2%	40.7%	38.7%	33.5%	24.6%	13.9%	5.8%	10.2%	9.0%	5.5%	18.4%	7.3%	1.4%	5.3%	4.1%	2.2%	2.1%
1.8	43.6%	41.6%	40.4%	37.2%	32.9%	25.1%	11.9%	13.0%	10.0%	8.2%	-1.1%	14.8%	11.1%	1.7%	2.2%	4.1%	2.7%	2.7%
2	43.8%	42.8%	40.6%	35.9%	29.5%	24.7%	10.3%	12.0%	7.1%	11.0%	6.0%	12.0%	14.0%	-0.1%	0.5%	3.8%	2.4%	2.5%
2.5	44.6%	43.8%	42.6%	39.2%	33.9%	27.5%	15.2%	10.8%	11.6%	12.1%	13.1%	14.7%	14.1%	1.8%	1.7%	4.8%	3.4%	3.5%
3	45.1%	44.3%	43.0%	39.5%	36.4%	34.3%	29.0%	13.2%	19.1%	20.2%	13.5%	17.8%	14.6%	5.9%	4.1%	5.4%	4.2%	4.3%
5	45.4%	44.6%	43.3%	40.5%	36.7%	34.5%	29.0%	24.1%	22.3%	22.3%	18.5%	18.7%	14.8%	11.7%	8.8%	5.7%	4.3%	4.3%
10	45.4%	44.6%	43.3%	40.5%	36.7%	34.5%	29.0%	24.1%	22.3%	22.3%	18.5%	18.7%	14.8%	11.7%	8.8%	5.7%	4.3%	4.3%
15	45.4%	44.6%	43.3%	40.5%	36.7%	34.5%	29.0%	24.1%	22.3%	22.3%	18.5%	18.7%	14.8%	11.7%	8.8%	5.7%	4.3%	4.3%

FINDI30

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
39.6%																		
0.025	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%
0.05	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%	-11.2%
0.1	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%	-45.2%
0.2				-42.0%	-42.0%		-41.9%	-42.0%	-42.0%									
0.4	8.0%	2.2%	2.1%	2.6%	-11.4%	-7.2%	-47.7%		-40.0%			-44.6%		-44.6%		-40.4%	-40.3%	
0.6	37.5%	37.1%	34.9%	29.1%	19.6%	18.9%	12.4%	1.0%	4.3%	-5.1%	-2.4%	-10.7%	-7.0%	-36.2%		-34.7%		-33.7%
0.8	49.3%	52.1%	50.5%	50.3%	40.6%	37.8%	27.5%	18.3%	22.0%	21.0%	16.9%	15.7%	10.7%	-9.0%	2.7%	1.3%	-23.3%	-22.3%
1	58.0%	54.8%	53.5%	50.3%	48.1%	39.9%	33.4%	24.2%	20.8%	20.9%	19.6%	19.6%	13.4%	11.2%	3.9%	8.4%	2.0%	1.5%
1.2	53.2%	53.3%	52.4%	44.0%	39.8%	36.9%	32.0%	22.9%	18.6%	17.3%	15.2%	18.7%	3.2%	8.4%	5.0%	6.5%	0.0%	-0.2%
1.4	48.3%	48.3%	46.7%	41.9%	29.8%	29.0%	28.3%	19.8%	16.0%	12.9%	8.9%	14.3%	12.8%	6.1%	9.7%	4.0%	-2.0%	-1.7%
1.6	48.5%	49.7%	47.0%	45.8%	31.1%	26.2%	24.1%	17.3%	12.5%	10.6%	5.1%	7.7%	11.1%	4.1%	8.7%	3.6%	1.2%	1.8%
1.8	48.5%	48.8%	46.3%	40.3%	25.6%	21.9%	23.8%	16.3%	8.6%	10.8%	2.4%	-3.9%	5.9%	2.6%	5.4%	5.7%	0.9%	1.9%
2	49.2%	48.8%	46.4%	43.3%	24.6%	19.2%	16.5%	15.2%	0.8%	6.7%	2.2%	-13.6%	-7.4%	2.2%	3.9%	4.3%	-0.3%	1.2%
2.5	54.0%	54.1%	52.6%	38.9%	28.6%	19.0%	23.0%	14.3%	0.0%	-7.9%	7.9%	3.2%		7.7%	3.3%	7.7%	0.5%	2.8%
3	53.8%	53.6%	52.0%	45.5%	31.9%	16.9%	23.2%	22.5%	10.6%	14.5%	14.7%	9.2%	1.6%	12.7%	1.0%	6.7%	0.3%	3.0%
5	55.5%	55.8%	53.8%	47.7%	33.7%	21.6%	29.0%	22.7%	22.9%	22.1%	19.8%	13.6%	8.3%	15.2%	8.1%	7.7%	3.3%	4.0%
10	55.5%	55.8%	53.8%	47.7%	33.7%	21.8%	29.0%	22.7%	22.9%	22.1%	19.8%	13.6%	8.3%	15.2%	8.1%	7.7%	3.3%	4.0%
15	55.5%	55.8%	53.8%	47.7%	33.7%	21.8%	29.0%	22.7%	22.9%	22.1%	19.8%	13.6%	8.3%	15.2%	8.1%	7.7%	3.3%	4.0%

General Retailers

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
38.4%																		
0.025	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
0.05	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%	-1.6%
0.1	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%
0.2	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%	-7.0%
0.4	3.3%	2.4%	8.6%	9.9%	2.9%	2.8%	2.2%	-0.3%	-5.2%	-0.2%	0.0%	-4.4%	-2.1%	-3.8%	-4.7%	-5.6%	-8.7%	-8.9%
0.6	37.5%	37.4%	37.2%	35.6%	33.1%	32.8%	30.6%	31.2%	27.2%	28.9%	28.2%	20.8%	19.8%	20.1%	12.4%	11.0%	6.6%	5.2%
0.8	39.8%	39.4%	39.0%	38.7%	37.5%	35.9%	32.1%	32.0%	28.0%	29.8%	31.0%	23.9%	22.4%	23.1%	21.1%	18.3%	8.4%	8.6%
1	41.4%	41.0%	40.6%	40.3%	38.3%	37.4%	36.9%	35.7%	33.0%	33.1%	32.3%	29.8%	26.2%	28.6%	24.7%	20.8%	11.0%	10.5%
1.2	42.3%	42.0%	41.6%	40.8%	39.2%	38.8%	37.5%	36.6%	33.9%	33.6%	33.7%	32.5%	26.7%	29.1%	25.9%	21.0%	13.4%	11.6%
1.4	43.0%	42.7%	42.1%	41.1%	39.9%	38.7%	37.2%	36.7%	34.8%	34.3%	34.4%	33.7%	30.9%	29.6%	26.6%	20.5%	13.5%	11.6%
1.6	42.9%	42.7%	42.2%	41.4%	39.5%	38.4%	36.9%	36.3%	35.3%	35.4%	34.4%	33.3%	31.2%	29.6%	26.4%	20.9%	13.7%	11.8%
1.8	43.6%	43.4%	42.6%	41.2%	39.2%	38.0%	37.6%	36.2%	35.5%	35.0%	35.0%	33.2%	31.8%	30.3%	26.3%	21.5%	14.4%	12.6%
2	43.7%	43.5%	42.9%	41.9%	39.7%	38.5%	37.5%	35.6%	36.0%	34.9%	34.8%	33.9%	32.9%	30.2%	28.9%	21.2%	14.6%	12.6%
2.5	43.8%	43.6%	43.1%	42.0%	40.1%	38.9%	38.2%	36.9%	36.0%	36.1%	35.1%	33.5%	33.5%	31.1%	28.9%	22.3%	15.4%	12.6%
3	43.9%	43.7%	43.1%	42.1%	40.4%	39.3%	38.6%	37.4%	35.9%	35.9%	35.3%	33.8%	33.5%	31.3%	28.6%	22.2%	15.2%	12.8%
5	44.0%	43.7%	43.2%	42.1%	40.5%	39.5%	38.9%	37.6%	36.4%	36.2%	35.4%	34.0%	33.7%	31.7%	29.3%	22.3%	15.6%	13.2%
10	44.0%	43.7%	43.2%	42.1%	40.5%	39.5%	38.9%	37.6%	36.4%	36.2%	35.4%	34.0%	33.7%	31.7%	29.3%	22.3%	15.6%	13.2%
15	44.0%	43.7%	43.2%	42.1%	40.5%	39.5%	38.9%	37.6%	36.4%	36.2%	35.4%	34.0%	33.7%	31.7%	29.3%	22.3%	15.6%	13.2%

GLDX

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
5.5%																		
0.025	-0.9%	-0.9%	-0.9%	-0.9%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
0.05	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%
0.1	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%	-3.7%
0.2	-9.0%	-9.0%	-9.0%	-9.0%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%	-8.9%
0.4	-5.8%	-5.6%	-5.4%	-4.4%	-4.8%	-5.2%	-8.0%	-10.9%	-16.3%	-18.0%	-20.1%	-13.4%	-18.2%	-18.2%	-20.2%	-23.7%	-23.5%	-23.5%
0.6	12.5%	13.5%	9.9%	9.6%	2.2%	-2.6%	-0.5%	-1.4%	-5.1%	-4.8%	-2.6%	-2.9%	-4.1%	-6.1%	-8.3%	-8.8%	-8.9%	-8.9%
0.8	23.7%	17.4%	9.9%	5.7%	0.3%	1.7%	0.3%	2.7%	-0.7%	0.3%	1.8%	2.2%	1.4%	-3.1%	-2.5%	-2.8%	-2.9%	-2.9%
1	29.3%	28.4%	24.6%	14.1%	5.8%	1.8%	4.0%	4.3%	2.5%	3.4%	2.8%	4.6%	2.7%	-2.1%	-1.9%	-0.9%	-0.7%	-0.6%
1.2	34.4%	32.5%	30.5%	20.9%	8.5%	6.3%	3.0%	0.8%	2.9%	-0.5%	2.9%	1.7%	3.9%	-1.1%	-0.3%	1.9%	3.0%	3.1%
1.4	35.3%	34.6%	32.6%	27.4%	13.0%	7.0%	1.1%	-2.7%	0.9%	-1.6%	1.0%	-1.8%	0.7%	-0.5%	-1.8%	1.3%	2.6%	3.0%
1.6	34.9%	34.2%	33.0%	28.1%	12.4%	4.7%	4.0%	-6.6%	-1.5%	0.2%	-0.3%	-1.9%	-1.2%	-1.7%	-2.2%	1.8%	2.1%	2.8%
1.8	35.5%	34.3%	32.4%	28.9%	7.6%	2.0%	-1.4%	1.0%	-7.7%	-6.4%	-5.2%	-3.8%	-1.4%	-1.6%	-2.1%	0.9%	2.1%	2.7%
2	34.5%	33.5%	32.7%	28.3%	18.6%	12.2%	-2.0%	0.1%	-6.4%	-5.2%	-4.5%	-5.7%	-2.1%	-3.3%	-1.0%	0.9%	2.4%	2.8%
2.5	35.0%	34.1%	31.8%	28.2%	11.6%	8.3%	1.7%	-4.4%	-5.1%	-4.4%	-13.0%	-7.2%	-2.6%	-2.9%	-1.5%	0.3%	1.7%	2.6%
3	35.2%	34.3%	32.8%	28.6%	12.4%	7.0%	0.9%	-6.1%	-10.0%	-5.7%	-8.1%	-13.6%	-5.0%	-1.5%	-0.5%	-0.1%	1.8%	2.9%
5	35.4%	34.5%	33.2%	29.2%	17.7%	7.6%	2.8%	0.0%	-5.5%	-8.4%	-7.4%	-7.7%	-3.9%	-2.0%	0.3%	-0.6%	2.4%	3.0%
10	35.4%	34.5%	33.2%	29.2%	17.7%	7.6%	2.8%	0.0%	-5.5%	-8.4%	-7.0%	-7.7%	-3.9%	-1.9%	0.3%	-0.5%	2.4%	3.0%
15	35.4%	34.5%	33.2%	29.2%	17.7%	7.6%	2.8%	0.0%	-5.5%	-8.4%	-7.0%	-7.7%	-3.9%	-1.9%	0.3%	-0.5%	2.4%	3.0%

INDI25

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
28.3%																		
0.025	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%	-3.3%
0.05	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%	-7.9%
0.1	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%	-44.9%
0.2	-40.2%		-41.6%		-40.8%		-40.7%			-40.8%	-40.8%							
0.4	6.0%	5.4%	4.3%	1.9%	-4.2%		-7.9%		-28.4%		-39.2%			-45.4%				
0.6	50.1%	51.7%	51.6%	47.5%	26.9%	29.7%	21.2%	12.6%	11.6%	-7.0%	-3.2%	-5.5%	-1.0%	12.4%	7.8%	-32.7%	-16.4%	-37.2%
0.8	54.5%	54.6%	54.3%	52.4%	43.3%	41.8%	28.5%	36.0%	29.7%	13.1%	10.2%	17.6%	22.6%	10.4%	13.0%	-4.0%	-3.8%	-2.8%
1	58.5%	58.8%	57.7%	56.6%	50.7%	44.6%	29.0%	41.1%	32.4%	24.6%	19.9%	18.1%	28.7%	13.5%	18.6%	4.5%	6.8%	7.5%
1.2	58.5%	58.5%	55.8%	55.2%	50.3%	40.1%	35.9%	38.2%	30.6%	31.2%	13.1%	18.8%	23.0%	13.1%	18.1%	3.2%	7.7%	8.5%
1.4	59.3%	58.5%	56.8%	56.0%	47.7%	40.9%	36.6%	36.5%	27.0%	25.7%	17.5%	15.8%	18.6%	9.9%	17.4%	7.1%	7.1%	8.2%
1.6	60.2%	58.8%	58.2%	55.2%	47.6%	38.9%	33.0%	22.9%	21.7%	18.8%	14.7%	17.0%	18.0%	9.8%	17.3%	9.9%	6.6%	7.9%
1.8	60.1%	59.8%	58.6%	55.3%	46.3%	40.8%	32.5%	21.8%	18.8%	16.8%	17.1%	14.6%	16.2%	13.5%	15.7%	9.1%	5.9%	7.6%
2	59.9%	60.0%	58.5%	54.7%	48.1%	36.6%	31.8%	24.9%	16.3%	15.5%	15.4%	11.3%	15.2%	17.7%	14.2%	15.8%	8.8%	7.9%
2.5	60.6%	60.4%	59.0%	55.5%	49.1%	45.1%	34.5%	25.6%	20.0%	15.0%	17.2%	13.2%	12.2%	16.9%	15.7%	15.5%	8.5%	7.9%
3	61.0%	60.7%	59.5%	56.8%	49.5%	45.1%	33.1%	27.5%	21.2%	21.3%	22.1%	18.3%	13.3%	15.1%	17.2%	14.9%	7.9%	7.7%
5	61.1%	60.8%	59.6%	57.0%	50.9%	46.1%	38.8%	33.0%	21.6%	23.7%	22.8%	18.5%	15.5%	19.6%	17.7%	15.2%	8.6%	8.0%
10	61.1%	60.8%	59.6%	57.0%	50.9%	46.1%	38.8%	33.0%	21.6%	23.7%	22.8%	18.5%	15.5%	19.6%	17.7%	15.2%	8.6%	8.0%
15	61.1%	60.8%	59.6%	57.0%	50.9%	46.1%	38.8%	33.0%	21.6%	23.7%	22.8%	18.5%	15.5%	19.6%	17.7%	15.2%	8.6%	8.0%

MidCap60

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
75.0%																		
0.025	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%	-3.6%
0.05	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%
0.1																		
0.2																		
0.4	64.4%	64.2%	64.2%	63.8%	60.6%	59.0%	55.1%	52.6%	38.2%	47.5%	43.7%	33.8%	44.2%	50.5%	44.7%	32.6%	20.0%	-7.8%
0.6	73.5%	73.4%	72.4%	71.4%	69.9%	65.7%	67.8%	68.2%	60.6%	64.7%	63.7%	62.8%	59.9%	61.0%	54.8%	38.4%	34.5%	18.6%
0.8	79.7%	78.4%	78.2%	76.4%	75.6%	73.1%	72.3%	72.0%	69.7%	68.6%	67.9%	67.7%	65.8%	63.6%	60.9%	50.7%	46.0%	30.8%
1	80.9%	80.6%	79.6%	77.7%	76.3%	74.0%	72.5%	72.6%	71.3%	69.6%	68.5%	68.6%	67.6%	64.8%	63.8%	56.2%	47.4%	33.8%
1.2	82.1%	81.9%	81.0%	80.2%	78.0%	76.2%	74.8%	73.6%	71.7%	70.4%	69.2%	69.0%	68.1%	65.8%	64.9%	56.2%	48.5%	36.0%
1.4	82.0%	81.7%	81.0%	79.8%	78.1%	76.6%	75.2%	74.0%	72.3%	70.0%	69.0%	69.3%	68.1%	65.4%	64.4%	55.6%	48.1%	35.4%
1.6	83.0%	82.1%	81.6%	80.5%	78.4%	76.9%	75.1%	73.8%	72.8%	69.7%	69.9%	69.6%	68.6%	65.2%	64.6%	56.0%	48.4%	38.4%
1.8	82.8%	82.5%	82.1%	80.4%	78.7%	76.7%	74.8%	74.1%	73.1%	69.6%	69.7%	69.1%	68.6%	66.3%	64.9%	56.4%	48.2%	38.2%
2	83.2%	82.9%	82.4%	81.0%	79.1%	77.0%	75.5%	74.3%	73.6%	71.7%	70.1%	69.1%	68.6%	66.1%	64.8%	57.2%	48.5%	41.8%
2.5	83.1%	82.8%	82.2%	81.5%	79.6%	77.7%	76.3%	74.3%	73.7%	72.4%	70.9%	69.7%	68.4%	66.8%	63.7%	58.9%	49.0%	40.0%
3	83.2%	82.8%	82.3%	81.5%	79.8%	77.8%	76.4%	74.5%	73.6%	72.4%	71.1%	69.7%	68.6%	66.4%	64.6%	59.1%	49.7%	43.5%
5	83.2%	82.9%	82.4%	81.6%	79.9%	78.2%	76.7%	75.1%	74.1%	72.8%	71.2%	69.9%	68.6%	66.4%	64.8%	59.4%	50.7%	43.6%
10	83.2%	82.9%	82.4%	81.6%	79.9%	78.2%	76.7%	75.1%	74.1%	72.8%	71.5%	70.2%	68.8%	66.5%	65.0%	59.6%	50.7%	43.6%
15	83.2%	82.9%	82.4%	81.6%	79.9%	78.2%	76.7%	75.1%	74.1%	72.8%	71.5%	70.2%	68.8%	66.5%	65.0%	59.6%	50.7%	43.6%

RESI10

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
40.7%																		
0.025	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%	-28.4%
0.05																		
0.1																		
0.2																		
0.4																		
0.6	46.4%	46.4%	45.4%	39.6%	34.2%	35.1%	18.2%											
0.8	67.7%	60.4%	59.7%	50.7%	39.9%	35.8%	17.7%											
1	71.5%	71.5%	58.9%	59.7%	44.9%	41.2%	31.9%	0.3%	20.2%								5.3%	5.7%
1.2	73.8%	73.3%	68.8%	63.1%	55.8%	40.6%	37.8%	16.9%	18.4%							-23.3%	11.5%	11.9%
1.4	70.8%	70.1%	69.6%	63.7%	50.9%	36.9%	32.9%	10.6%	4.5%	0.9%	-6.9%						9.8%	10.3%
1.6	70.2%	68.9%	65.4%	59.4%	46.8%	36.4%	28.6%		0.6%	-8.6%						2.5%	12.2%	12.7%
1.8	77.1%	69.3%	65.3%	58.1%	45.7%	38.7%	29.6%		12.2%							2.4%	12.2%	12.8%
2	75.7%	73.2%	71.9%	57.4%	45.1%	37.7%	24.7%		0.7%							-4.9%	11.2%	12.0%
2.5	76.3%	75.1%	68.6%	61.6%	42.0%	37.1%	27.7%		2.1%	-11.8%						2.4%	13.3%	14.0%
3	77.1%	75.8%	71.6%	65.0%	45.5%	37.9%	32.4%		9.7%							9.4%	16.4%	17.0%
5	77.4%	76.2%	73.6%	65.5%	47.3%	38.3%	35.8%		16.0%	-17.6%						9.9%	16.6%	17.1%
10	77.4%	76.2%	73.6%	65.5%	47.3%	38.3%	35.8%		16.0%	-17.6%						9.9%	16.6%	17.1%
15	77.4%	76.2%	73.6%	65.5%	47.3%	38.3%	35.8%		16.0%	-17.6%						9.9%	16.6%	17.1%

SA Property

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
14.3%																		
0.025	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
0.05	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
0.1	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
0.2	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%	-1.3%
0.4	9.7%	9.5%	10.1%	9.5%	6.6%	6.6%	5.8%	3.6%	4.7%	3.5%	4.3%	2.8%	2.5%	2.4%	1.8%	2.6%	0.3%	0.4%
0.6	15.3%	15.2%	15.0%	14.6%	12.7%	10.6%	10.6%	8.8%	9.2%	8.1%	6.2%	5.9%	5.1%	5.6%	3.8%	3.8%	1.5%	1.7%
0.8	16.6%	16.5%	16.3%	15.1%	12.8%	11.5%	11.6%	10.4%	10.1%	9.3%	9.4%	7.2%	6.7%	5.8%	4.4%	4.4%	1.9%	2.3%
1	17.4%	17.2%	17.0%	16.0%	15.0%	13.1%	13.4%	11.3%	11.7%	10.3%	10.2%	8.2%	7.6%	7.3%	5.5%	4.7%	2.7%	2.6%
1.2	17.8%	17.5%	17.3%	16.9%	15.2%	14.1%	13.5%	12.6%	11.9%	11.0%	10.7%	10.0%	8.1%	7.3%	5.9%	5.0%	2.9%	2.8%
1.4	18.7%	18.6%	18.3%	17.7%	16.3%	15.1%	14.7%	14.0%	13.1%	12.9%	12.3%	10.4%	8.6%	9.2%	6.8%	5.6%	3.2%	3.1%
1.6	18.5%	18.4%	18.1%	17.5%	16.0%	15.3%	14.6%	13.8%	13.3%	12.8%	12.3%	11.6%	9.0%	9.1%	7.1%	5.5%	3.1%	3.0%
1.8	18.6%	18.4%	18.1%	17.6%	16.5%	15.3%	14.6%	14.1%	13.7%	12.9%	12.7%	12.0%	10.9%	9.2%	8.7%	5.5%	3.3%	3.1%
2	18.8%	18.7%	18.4%	17.8%	16.7%	15.6%	14.8%	14.6%	13.9%	13.3%	12.8%	12.4%	11.8%	9.2%	8.9%	5.6%	3.3%	3.1%
2.5	18.9%	18.8%	18.5%	17.9%	16.8%	16.0%	15.2%	14.6%	14.1%	13.2%	12.8%	12.4%	11.8%	9.7%	8.9%	5.5%	3.3%	3.1%
3	19.0%	18.8%	18.5%	17.9%	16.7%	15.9%	15.1%	14.6%	14.0%	13.5%	12.7%	12.3%	11.7%	9.6%	9.1%	5.8%	3.4%	3.1%
5	18.9%	18.8%	18.5%	17.9%	16.7%	16.0%	15.2%	14.7%	14.0%	13.6%	12.7%	12.3%	11.7%	10.5%	9.1%	5.8%	3.8%	3.1%
10	19.0%	18.8%	18.5%	17.9%	16.7%	16.0%	15.2%	14.7%	14.0%	13.6%	12.7%	12.3%	11.7%	10.5%	9.1%	5.8%	3.8%	3.1%
15	19.0%	18.8%	18.5%	17.9%	16.7%	16.0%	15.2%	14.7%	14.0%	13.6%	12.7%	12.3%	11.7%	10.5%	9.1%	5.8%	3.8%	3.1%

SWIX Top40

ATR stop	Next pyramid/entry ATR																	
11.2%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%
0.05	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%
0.1	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%
0.2	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%	-12.6%
0.4	3.5%	0.7%	0.1%	-5.9%	-16.2%	-39.6%	-18.6%	-15.2%	-27.1%	-20.8%	-36.7%	-33.5%	-29.3%	-31.2%	-35.7%	-29.4%	-29.4%	-29.4%
0.6	16.0%	14.1%	12.0%	7.5%	-12.0%	-1.7%	-13.2%	-2.8%	-3.6%	-2.4%	-5.2%	-11.7%	-8.0%	-11.6%	-11.7%	-13.5%	-12.2%	-12.4%
0.8	27.5%	27.4%	27.9%	19.1%	11.2%	2.2%	8.2%	4.6%	2.9%	4.0%	3.3%	1.3%	-2.6%	-2.8%	-2.7%	-4.2%	-4.6%	-4.6%
1	34.8%	26.4%	25.4%	24.1%	13.9%	6.5%	1.9%	1.1%	3.6%	2.4%	1.6%	3.9%	-1.7%	-1.0%	-2.8%	-2.2%	-2.3%	-2.0%
1.2	36.4%	35.3%	34.2%	30.9%	15.3%	6.7%	3.1%	-3.6%	1.8%	-0.4%	0.2%	2.8%	-1.6%	0.2%	-2.2%	0.0%	0.4%	1.0%
1.4	40.2%	39.8%	36.1%	28.1%	9.5%	6.5%	1.1%	-8.7%	-2.8%	-4.0%	-3.6%	1.0%	-1.2%	-1.8%	-0.3%	0.4%	1.8%	1.7%
1.6	38.7%	37.9%	37.2%	31.6%	8.1%	4.3%	-5.2%	-4.0%	-6.2%	-5.7%	-11.4%	-3.2%	-4.0%	-4.4%	0.9%	0.5%	2.0%	2.0%
1.8	39.0%	38.4%	37.4%	32.3%	19.0%	3.7%	-7.4%	-8.8%	-7.0%	-12.6%	-12.9%	-5.4%	-5.2%	-5.6%	-1.4%	0.0%	1.2%	1.7%
2	41.4%	38.8%	36.3%	32.5%	16.0%	2.8%	-1.9%	-10.6%	-24.9%	-23.4%	-5.6%	-10.0%	-6.4%	-6.9%	-1.8%	-1.7%	1.8%	2.6%
2.5	42.2%	41.8%	40.7%	34.5%	25.6%	13.5%	-0.9%	-3.0%	-8.5%	-34.8%	-13.9%	-5.8%	2.1%	-0.2%	2.0%	0.1%	3.5%	4.4%
3	42.3%	41.8%	40.8%	38.0%	29.6%	17.0%	9.3%	2.1%	5.2%	-3.3%	-3.2%	0.0%	-0.1%	0.9%	2.6%	1.7%	3.4%	4.1%
5	42.7%	42.2%	41.3%	38.4%	31.0%	26.4%	18.8%	11.2%	9.2%	5.8%	3.8%	0.9%	5.1%	2.8%	2.8%	1.8%	3.6%	4.5%
10	42.7%	42.2%	41.3%	38.4%	31.0%	26.4%	18.8%	11.2%	9.2%	5.8%	3.8%	2.5%	5.1%	2.8%	2.8%	1.8%	3.6%	4.5%
15	42.7%	42.2%	41.3%	38.4%	31.0%	26.4%	18.8%	11.2%	9.2%	5.8%	3.8%	2.5%	5.1%	2.8%	2.8%	1.8%	3.6%	4.5%

TOP40

ATR stop	Next pyramid/entry ATR																	
21.6%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%	-4.9%
0.05	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%	-13.6%
0.1																		
0.2																		
0.4	15.3%	13.8%		-18.9%														
0.6	33.5%	32.7%	32.3%	20.4%	1.3%	2.1%			2.6%			-7.2%		-11.2%				
0.8	54.3%	51.7%	51.1%	31.9%	20.0%	10.2%	6.1%	7.2%	12.7%	-5.3%	-0.1%	5.7%	-19.8%	-2.2%	-20.0%	-17.2%	-9.4%	-9.4%
1	56.3%	54.8%	53.0%	47.3%	29.4%	20.9%	8.2%	5.6%	9.4%	3.1%	1.4%	-2.5%	-17.7%	-18.7%		-37.7%	-6.7%	-6.7%
1.2	58.1%	53.4%	43.3%	38.2%	22.1%	23.2%	13.0%		7.8%	-6.1%		-14.9%		2.8%		-4.7%	0.1%	-0.4%
1.4	57.7%	56.1%	51.8%	31.6%	26.4%	29.3%	21.8%	-1.3%	4.8%	-5.5%	-28.8%	0.9%		-0.7%	-29.6%	-2.5%	2.0%	1.6%
1.6	56.2%	54.9%	51.8%	37.3%	26.8%	26.7%	22.7%	-7.7%	2.0%			-12.4%	-6.3%	-11.4%	-6.8%	-1.8%	3.4%	3.0%
1.8	56.6%	54.3%	47.9%	39.2%	28.5%	27.5%	21.2%	10.6%		1.6%			-7.3%	-18.5%	-8.2%	-4.3%	4.5%	4.2%
2	58.7%	57.0%	50.6%	39.5%	25.5%	23.9%	23.4%	-2.5%		-6.8%					-21.0%	-6.5%	4.0%	3.7%
2.5	60.0%	56.9%	54.0%	40.1%	26.4%	22.1%	18.9%	14.4%		-1.8%					-27.4%	-9.3%	5.2%	4.9%
3	62.9%	60.3%	57.8%	49.3%	31.3%	28.9%	21.1%	16.7%	10.4%	4.2%					-8.8%	0.4%	6.7%	7.1%
5	62.9%	60.3%	57.8%	50.2%	32.0%	29.6%	22.3%	16.7%	6.9%	7.9%	-12.7%			-3.7%	-3.4%	0.7%	7.1%	7.2%
10	62.9%	60.3%	57.8%	50.2%	32.0%	29.6%	22.3%	16.7%	6.9%	7.9%	-12.7%			-3.7%	-3.4%	0.7%	7.1%	7.2%
15	62.9%	60.3%	57.8%	50.2%	32.0%	29.6%	22.3%	16.7%	6.9%	7.9%	-12.7%			-3.7%	-3.4%	0.7%	7.1%	7.2%

Precious Metals

Copper

ATR stop \ Next pyramid/entry ATR	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15	20
38.0%																		
0.05	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%	-4.1%
0.1	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%	-9.3%
0.2	-36.2%	-33.7%	-30.2%	-27.8%	-29.4%	-28.7%	-28.0%	-20.7%	-19.4%	-24.2%	-23.5%	-23.0%	-27.1%	-26.6%	-24.8%	-25.8%	-25.8%	-25.8%
0.4	20.0%	12.1%	12.2%	5.1%	4.7%	4.4%		-4.1%	-14.4%	-4.4%	-5.5%	-11.4%	-15.0%	-19.2%	-17.7%	-18.1%	-18.1%	-18.1%
0.6	57.8%	54.6%	30.1%	36.8%	31.7%	32.8%	27.7%	23.5%	11.8%	-9.7%	20.2%	12.4%	-1.6%	12.3%	-7.7%	1.8%	-1.4%	-3.8%
0.8	65.5%	63.4%	57.9%	38.3%	38.0%	32.6%	32.7%	26.7%	13.0%	12.8%	24.3%	14.0%	7.1%	13.9%	-7.9%	3.3%	0.9%	-1.5%
1	69.0%	68.4%	64.6%	41.7%	45.3%	44.9%	25.3%	30.6%	13.3%	17.4%	23.8%	21.0%	11.5%	15.0%	3.6%	10.3%	8.3%	6.5%
1.2	77.0%	75.3%	69.2%	58.6%	58.6%	42.6%	32.4%	31.9%	34.9%	22.3%	23.4%	28.4%	25.6%	23.4%	15.0%	9.0%	11.4%	10.5%
1.4	76.8%	70.8%	64.5%	61.7%	58.6%	42.3%	50.8%	27.2%	40.0%	31.3%	23.5%	27.4%	24.3%	26.6%	14.1%	9.6%	11.8%	10.9%
1.6	80.7%	78.0%	68.5%	53.1%	58.9%	56.6%	49.6%	29.6%	39.4%	43.1%	29.3%	25.3%	30.2%	27.5%	14.3%	14.7%	12.1%	11.3%
1.8	81.2%	75.9%	68.4%	50.4%	54.5%	52.7%	46.3%	36.1%	36.2%	42.4%	33.7%	24.5%	28.5%	26.2%	13.6%	14.7%	12.1%	11.3%
2	78.0%	75.0%	70.7%	51.4%	45.7%	47.1%	44.1%	39.9%	34.7%	40.5%	35.6%	31.9%	27.3%	25.5%	21.1%	14.8%	12.2%	11.3%
2.5	82.4%	75.1%	70.5%	63.0%	56.1%	51.7%	42.1%	39.7%	47.0%	39.5%	35.1%	32.8%	26.3%	26.5%	21.7%	15.0%	12.4%	11.6%
3	82.7%	79.2%	70.4%	63.2%	60.9%	47.1%	46.8%	41.1%	43.4%	41.1%	34.0%	33.0%	26.5%	29.4%	21.2%	14.9%	12.2%	11.4%
5	83.4%	79.9%	76.5%	63.5%	61.3%	54.5%	47.8%	41.7%	43.5%	41.7%	36.9%	34.4%	28.5%	29.9%	21.6%	15.2%	12.6%	11.8%
10	83.4%	79.9%	76.5%	63.5%	61.3%	54.5%	47.8%	41.7%	43.5%	41.7%	36.9%	34.4%	28.5%	29.9%	21.6%	15.2%	12.6%	11.8%
15	83.4%	79.9%	76.5%	63.5%	61.3%	54.5%	47.8%	41.7%	43.5%	41.7%	36.9%	34.4%	28.5%	29.9%	21.6%	15.2%	12.6%	11.8%
20	83.4%	79.9%	76.5%	63.5%	61.3%	54.5%	47.8%	41.7%	43.5%	41.7%	36.9%	34.4%	28.5%	29.9%	21.6%	15.2%	12.6%	11.8%

Gold

ATR stop \ Next pyramid/entry ATR	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15	20
89.8%																		
0.05																		
0.1	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%	-58.3%
0.2																		
0.4	53.2%		52.9%	49.7%		-34.8%		-31.9%	-31.8%					-32.5%	-31.9%	-31.9%	-31.9%	-31.9%
0.6	110.7%	98.6%	85.5%		60.4%	54.8%	49.7%				47.2%	45.0%		-19.9%		-17.6%		
0.8	132.8%	132.4%	89.3%		63.7%	56.0%	69.4%				-24.1%	54.0%	57.6%	63.6%	18.9%	23.5%		
1	132.5%	127.4%	110.7%	88.1%	87.3%	79.3%	79.0%	66.3%	79.3%	82.3%	55.9%	55.6%	67.3%	63.8%		32.6%	24.7%	24.8%
1.2	134.9%	133.6%	129.0%	88.9%	90.0%	101.2%	86.6%	63.3%	76.9%	79.5%	71.7%	46.2%	65.6%	61.2%	33.5%	36.3%	28.5%	28.3%
1.4	135.0%	133.5%	104.3%	83.7%	83.7%	100.5%	86.2%		77.4%	75.9%	77.4%	64.1%	67.5%	62.3%	53.3%	36.1%	27.3%	28.5%
1.6	136.0%	134.7%	129.6%	90.4%	81.8%	80.7%	81.3%	84.3%	83.9%	73.7%	77.8%	67.9%	62.4%	62.0%	52.5%	36.1%	26.4%	29.1%
1.8	134.6%	133.3%	128.2%	83.8%	80.0%		85.9%	79.6%	83.7%	78.9%	82.2%	67.5%	60.8%	69.7%	52.8%	38.4%	25.4%	29.6%
2	135.2%	132.4%	131.6%	82.8%	85.1%	80.0%	73.0%	78.9%	81.7%	78.9%	82.8%	75.2%	60.0%	69.4%	55.6%	39.0%	24.7%	30.4%
2.5	140.0%	137.8%	131.0%	100.1%	88.1%	82.1%	79.3%	84.3%	81.4%	78.0%	82.5%	81.6%	73.2%	73.2%	61.8%	41.3%	33.3%	35.3%
3	141.4%	139.3%	135.2%	111.8%	98.8%	93.7%	83.2%	85.6%	80.3%	80.0%	80.1%	78.1%	80.8%	74.5%	60.5%	42.8%	35.3%	37.1%
5	140.2%	137.9%	134.9%	114.3%	101.3%	94.1%	94.2%	95.4%	82.3%	82.1%	83.6%	81.6%	81.0%	74.5%	60.3%	42.3%	34.7%	36.6%
10	141.3%	139.7%	135.6%	114.6%	101.4%	94.2%	94.3%	95.4%	82.4%	83.4%	83.8%	82.7%	80.9%	74.7%	60.7%	43.0%	35.5%	37.3%
15	141.3%	139.7%	135.6%	114.6%	101.4%	94.2%	94.3%	95.4%	82.4%	83.4%	83.8%	82.7%	80.9%	74.7%	60.7%	43.0%	35.5%	37.3%
20	141.3%	139.7%	135.6%	114.6%	101.4%	94.2%	94.3%	95.4%	82.4%	83.4%	83.8%	82.7%	80.9%	74.7%	60.7%	43.0%	35.5%	37.3%

Palladium

ATR stop \ Next pyramid/entry ATR	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15	20
91.2%																		
0.05																		
0.1																		
0.2																		
0.4																		
0.6	88.8%	64.1%	65.7%	46.0%	46.9%	62.5%	61.6%	61.5%	61.4%	58.7%	31.6%	60.1%	45.9%	49.8%	44.1%	-3.3%		7.3%
0.8	114.6%	100.9%	93.7%	96.7%	94.3%	94.0%	67.0%	60.4%	78.0%	65.4%	32.8%	62.7%	52.4%	52.6%	39.2%	29.4%	6.2%	16.2%
1	124.0%	111.0%	107.8%	107.1%	90.9%	92.6%	65.8%	66.9%	76.6%	64.8%	81.1%	81.4%	58.1%	39.7%	46.6%	29.3%	36.7%	29.8%
1.2	131.1%	114.8%	112.7%	96.8%	88.9%	90.9%	71.9%	77.9%	80.2%	76.2%	80.0%	79.4%	58.2%	56.8%	46.1%	28.7%	37.2%	30.5%
1.4	131.6%	129.5%	109.0%	96.4%	90.7%	95.7%	87.3%	76.6%	83.3%	77.9%	78.3%	78.9%	74.7%	57.7%	45.0%	27.5%	37.4%	30.8%
1.6	133.6%	129.4%	123.8%	111.5%	110.0%	93.8%	95.5%	81.6%	89.8%	76.3%	77.0%	79.1%	73.3%	58.1%	44.8%	29.2%	35.9%	28.8%
1.8	133.5%	130.4%	120.2%	111.4%	109.0%	93.9%	96.5%	92.7%	93.4%	79.0%	80.5%	79.0%	78.8%	57.1%	45.5%	30.3%	37.0%	30.2%
2	132.9%	130.2%	121.3%	106.4%	100.9%	94.9%	95.8%	80.4%	92.3%	79.7%	78.9%	78.4%	77.9%	56.6%	44.4%	30.5%	37.4%	30.7%
2.5	132.4%	130.1%	125.2%	109.6%	102.8%	93.1%	96.6%	82.2%	91.9%	82.3%	78.5%	76.6%	77.0%	74.3%	44.8%	29.6%	37.4%	30.7%
3	132.7%	130.0%	125.1%	112.2%	104.2%	94.9%	95.6%	92.2%	92.1%	82.1%	79.5%	75.6%	76.5%	74.2%	62.6%	41.8%	37.0%	30.2%
5	133.3%	130.7%	125.7%	112.4%	106.4%	94.5%	96.5%	91.9%	93.3%	83.3%	79.1%	76.8%	78.4%	75.0%	63.4%	43.3%	38.7%	32.4%
10	133.3%	130.7%	125.7%	112.4%	106.4%	94.5%	96.5%	91.9%	93.3%	83.3%	79.1%	76.8%	78.4%	75.0%	63.4%	43.3%	38.7%	32.4%
15	133.3%	130.7%	125.7%	112.4%	106.4%	94.5%	96.5%	91.9%	93.3%	83.3%	79.1%	76.8%	78.4%	75.0%	63.4%	43.3%	38.7%	32.4%
20	133.3%	130.7%	125.7%	112.4%	106.4%	94.5%	96.5%	91.9%	93.3%	83.3%	79.1%	76.8%	78.4%	75.0%	63.4%	43.3%	38.7%	32.4%

Platinum

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
132.0%																		
0.025																		
0.05																		
0.1																		
0.2																		
0.4																		
0.6	132.7%	132.1%	130.0%	128.4%	116.4%	126.2%	116.1%	82.7%	104.4%	102.3%	76.6%	105.2%	70.7%	56.1%	6.1%	54.3%	29.5%	
0.8	164.2%	163.4%	162.4%	149.9%	143.2%	126.3%	123.8%	115.9%	113.8%	103.8%	105.9%	105.6%	111.1%	89.9%	85.3%	76.2%	50.3%	41.1%
1	166.1%	161.3%	158.9%	155.3%	138.1%	128.5%	115.4%	119.9%	112.5%	112.7%	103.2%	110.0%	110.8%	104.8%	102.5%	86.0%	57.7%	44.7%
1.2	168.2%	166.6%	163.3%	156.5%	146.2%	125.8%	111.4%	127.1%	111.6%	109.0%	103.6%	109.5%	111.2%	104.3%	103.0%	85.8%	57.2%	56.2%
1.4	166.2%	164.6%	160.3%	155.4%	146.5%	131.1%	125.1%	128.0%	111.7%	110.6%	107.2%	109.9%	112.4%	105.2%	105.1%	86.0%	55.3%	55.8%
1.6	164.7%	163.2%	161.5%	152.7%	147.3%	137.0%	127.6%	127.7%	113.2%	110.1%	117.8%	105.5%	110.9%	110.8%	103.6%	85.1%	51.7%	53.9%
1.8	164.7%	163.7%	160.2%	152.4%	147.4%	136.4%	126.2%	125.9%	124.4%	117.8%	115.3%	115.9%	112.8%	110.6%	102.7%	84.8%	49.7%	53.6%
2	164.7%	163.5%	159.1%	155.7%	148.6%	138.8%	137.7%	125.0%	124.3%	117.0%	114.6%	112.9%	112.6%	110.7%	106.2%	84.9%	58.9%	52.9%
2.5	165.1%	165.0%	161.6%	157.1%	149.8%	142.8%	139.6%	134.5%	129.5%	119.2%	114.7%	117.3%	115.5%	110.6%	105.6%	85.1%	57.2%	55.3%
3	165.0%	165.3%	162.4%	157.9%	149.8%	141.1%	140.0%	134.3%	129.6%	125.4%	114.7%	118.8%	118.1%	110.1%	105.0%	86.5%	62.3%	55.9%
5	166.8%	165.3%	162.3%	157.9%	150.8%	144.2%	141.0%	135.1%	129.8%	126.5%	121.4%	118.8%	118.3%	113.2%	106.3%	87.7%	62.2%	55.7%
10	166.8%	165.3%	162.3%	157.9%	150.8%	144.2%	141.0%	135.1%	129.8%	126.5%	121.4%	118.8%	118.3%	113.2%	106.3%	87.7%	62.2%	55.7%
15	166.8%	165.3%	162.3%	157.9%	150.8%	144.2%	141.0%	135.1%	129.8%	126.5%	121.4%	118.8%	118.3%	113.2%	106.3%	87.7%	62.2%	55.7%

Silver

ATR stop \ Next pyramid/entry ATR	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
40.9%	0.025	0.05	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	5	10	15
0.025	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%
0.05	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%	-1.8%
0.1	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%	-3.8%
0.2	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%	-7.8%
0.4	9.9%	9.5%	11.3%	10.2%	-10.7%	-13.2%	-5.5%	-9.8%	-11.8%	-10.0%	-8.9%	-12.9%	-12.2%	-11.3%	-7.6%	-9.6%	-5.6%	-7.9%
0.6	45.4%	45.3%	44.3%	43.0%	40.8%	41.1%	31.8%	9.7%	-7.7%	10.5%	21.7%	-2.5%	23.3%	15.7%	0.5%	1.8%	5.3%	1.2%
0.8	49.3%	49.1%	47.4%	44.1%	42.1%	41.3%	41.4%	42.7%	41.6%	31.0%	25.2%	31.4%	15.9%	6.0%	11.2%	4.7%	4.7%	3.4%
1	50.6%	50.2%	50.1%	46.9%	43.4%	42.2%	43.2%	42.5%	42.3%	33.9%	32.4%	29.8%	27.1%	15.9%	16.5%	10.0%	8.0%	7.5%
1.2	49.9%	49.4%	49.3%	47.7%	42.3%	40.4%	41.8%	41.9%	42.2%	35.2%	31.0%	30.0%	38.7%	28.0%	22.3%	9.7%	8.3%	9.1%
1.4	50.5%	49.7%	48.3%	45.7%	44.1%	39.2%	40.0%	41.1%	41.7%	41.0%	33.7%	28.7%	38.4%	27.3%	22.4%	9.5%	8.3%	9.1%
1.6	50.4%	49.6%	49.3%	44.5%	44.2%	39.3%	38.8%	40.3%	41.5%	39.9%	33.7%	28.5%	37.7%	26.8%	20.6%	9.5%	8.4%	9.4%
1.8	50.7%	50.2%	48.8%	45.4%	42.0%	38.1%	38.0%	38.6%	40.2%	38.7%	33.9%	32.5%	37.4%	26.4%	31.5%	10.8%	8.3%	10.1%
2	49.7%	49.1%	47.9%	44.5%	37.7%	38.5%	38.2%	37.8%	38.9%	37.1%	39.6%	33.3%	38.4%	25.6%	31.2%	10.9%	8.5%	10.3%
2.5	52.6%	49.1%	47.9%	45.0%	40.4%	38.3%	38.1%	36.3%	39.8%	37.2%	39.0%	32.5%	38.5%	36.2%	33.1%	22.1%	11.9%	10.7%
3	52.4%	51.7%	50.4%	44.0%	40.4%	40.5%	38.0%	37.8%	39.2%	37.3%	38.9%	38.9%	38.1%	36.0%	31.8%	21.0%	12.8%	10.5%
5	52.9%	52.2%	50.8%	47.4%	43.7%	42.3%	39.6%	35.7%	37.0%	36.3%	38.0%	37.3%	38.8%	35.6%	32.2%	25.2%	13.0%	11.6%
10	52.9%	52.2%	50.8%	47.4%	43.7%	42.3%	39.6%	38.8%	38.2%	38.4%	39.2%	38.1%	38.8%	36.8%	32.9%	25.2%	13.0%	11.6%
15	52.9%	52.2%	50.8%	47.4%	43.7%	42.3%	39.6%	38.8%	38.2%	38.4%	39.2%	38.1%	38.8%	36.8%	32.9%	25.2%	13.0%	11.6%

Copper		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	38.0%	31.3%	38.0%	50.4%	54.6%	57.1%	57.1%	57.6%	59.6%
Gold		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	89.8%	88.8%	89.8%	101.3%	110.7%	115.4%	114.8%	114.2%	113.4%
Palladium		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	91.2%	82.2%	91.2%	110.3%	111.7%	111.3%	115.0%	114.6%	114.5%
Platinum		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	132.0%	123.2%	132.0%	137.6%	135.4%	143.6%	142.9%	141.8%	141.4%
Silver		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	40.9%	27.5%	40.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%

8.4. Capital allocation account risk sensitivity analysis

Instrument	Energy								
Brent Crude		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	19.7%	16.4%	19.7%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%
Gasoline		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	38.5%	15.8%	38.5%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Heating Oil		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	7.2%	9.8%	7.2%	13.5%	21.9%	22.8%	24.6%	24.6%	24.6%
Natural Gas		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	41.7%	35.4%	41.7%	48.6%	52.8%	59.7%	62.1%	63.6%	63.6%
WTIA		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	21.3%	24.8%	21.3%	18.2%	15.2%	11.8%	10.6%	8.9%	7.3%

Instrument	Equity Indices								
African Banks		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	20.9%	13.3%	20.9%	20.8%	20.8%	20.8%	20.8%	20.8%	20.8%
ALSI		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	45.5%	31.6%	45.5%	47.0%	51.0%	51.2%	52.4%	52.4%	52.3%
Capped Top40		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	11.9%	11.6%	11.9%	16.9%	15.8%	12.8%	8.6%	2.9%	1.4%
DiviPlus		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Fin15		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	16.1%	9.5%	16.1%	21.5%	21.8%	22.1%	22.1%	22.1%	22.1%
Findi30		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	39.6%	27.8%	39.6%	42.8%	45.0%	46.7%	47.5%	47.5%	47.8%
General Retailers		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%
Gold Miners		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	5.5%	7.0%	5.5%	3.8%	2.7%	10.5%	10.5%	13.8%	13.8%
Indi25		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	44.1%	28.3%	44.1%	46.4%	47.5%	48.0%	48.0%	48.1%	48.2%
MidCap60		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	75.0%	74.3%	75.0%	75.3%	75.4%	75.5%	75.5%	75.5%	75.5%
Resi10		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	40.7%	38.8%	40.7%	39.3%	35.2%	33.2%	30.6%	28.7%	28.1%
SA Property		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%
SWIX Top40		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	11.2%	5.6%	11.2%	8.6%	8.9%	11.2%	11.2%	11.2%	11.2%
Top40		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	21.6%	21.0%	21.6%	25.6%	28.7%	31.8%	33.2%	38.0%	37.9%

Instrument	Currencies								
AUD/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	5.5%	5.1%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
BWP/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%	-2.3%
CAD/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	4.0%	4.5%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
CHF/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	6.1%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%
CNY/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
EUR/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	10.2%	9.8%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%
GBP/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	13.9%	13.7%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
NZD/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	8.6%	8.5%	8.6%	8.6%	8.6%	8.6%	8.6%	8.6%	8.6%
TKL/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	2.5%	2.9%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
USD/ZAR		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%
ZAR/JPY		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	6.7%	4.1%	6.7%	7.2%	7.0%	7.0%	7.0%	7.0%	7.0%

Instrument	Agriculture								
Coffee		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	46.7%	46.7%	46.7%	46.7%	46.5%	43.1%	40.1%	37.2%	33.0%
Corn		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	66.3%	52.8%	66.3%	74.0%	78.5%	82.0%	82.5%	82.7%	82.8%
Cotton		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	63.7%	65.9%	63.7%	76.8%	86.7%	93.5%	93.3%	93.1%	92.8%
Soya Beans		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	28.9%	27.2%	28.9%	30.5%	30.7%	30.8%	30.8%	30.9%	30.9%
Sugar		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	57.8%	57.1%	57.8%	73.4%	78.2%	87.6%	88.2%	88.4%	90.1%
Sunflower Seeds		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	63.0%	61.6%	63.0%	63.7%	64.0%	64.1%	64.1%	64.1%	64.1%
Wheat		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	50.7%	42.3%	50.7%	50.9%	51.1%	52.5%	51.3%	52.4%	52.4%
White Maize		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	46.2%	45.5%	46.2%	48.9%	49.2%	49.3%	49.3%	49.4%	49.4%
Yellow Maize		Account risk							
	CAGR	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
	46.0%	43.5%	46.0%	46.4%	46.6%	46.7%	46.8%	47.0%	47.0%

8.5. Additional trades (pyramiding) sensitivity analysis

Instrument	Precious Metals								
Copper		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	38.0%	7.3%	18.2%	26.3%	38.0%	46.9%	66.7%	72.8%	77.4%
Gold		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	89.8%	#NUM!	53.2%	68.9%	89.8%	126.0%	124.4%	108.4%	112.1%
Palladium		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	91.2%	27.7%	49.2%	69.4%	91.2%	125.2%	141.5%	151.3%	158.7%
Platinum		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	132.0%	50.8%	85.9%	109.7%	132.0%	133.8%	160.4%	181.1%	192.8%
Silver		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	40.9%	6.7%	19.4%	32.8%	40.9%	52.8%	61.9%	68.6%	75.5%

Instrument	Energy								
Brent Crude		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	19.7%	2.0%	9.6%	16.9%	19.7%	22.7%	25.2%	23.3%	22.3%
Gasoline		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	38.5%	4.9%	19.0%	32.5%	38.5%	47.4%	41.5%	44.2%	33.8%
Heating Oil		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	7.2%	0.9%	3.2%	5.7%	7.2%	5.6%	6.6%	6.7%	10.7%
Natural Gas		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	41.7%	8.7%	15.1%	30.5%	41.7%	46.8%	61.3%	51.8%	56.4%
WTIA		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	21.3%	3.1%	8.7%	17.9%	21.3%	28.4%	33.5%	45.9%	54.1%

Instrument	Equity Indices								
African Banks		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	20.9%	1.5%	7.4%	17.4%	20.9%	20.3%	28.8%	31.3%	28.6%
ALSI		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	45.5%	6.1%	18.3%	23.2%	45.5%	41.8%	39.4%	43.2%	42.5%
Capped Top40		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	11.9%	-5.8%	-2.6%	4.6%	11.9%	24.1%	34.4%	37.1%	16.0%
DiviPlus		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	2.4%	0.4%	1.1%	2.3%	2.4%	3.6%	4.3%	5.3%	6.3%
Fin15		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	16.1%	2.3%	9.3%	23.2%	16.1%	28.3%	34.4%	40.3%	41.9%
Findi30		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	39.6%	0.2%	13.2%	22.5%	39.6%	48.0%	52.7%	55.4%	54.1%
General Retailers		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	38.4%	10.1%	22.3%	31.0%	38.4%	43.5%	48.6%	51.6%	54.6%
Gold Miners		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	5.5%	-0.6%	2.0%	3.6%	5.5%	15.2%	14.6%	16.2%	20.4%
Indi25		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	44.1%	6.1%	16.8%	31.8%	44.1%	52.1%	56.1%	60.9%	60.7%
MidCap60		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	75.0%	19.5%	54.5%	66.2%	75.0%	82.0%	88.6%	94.5%	99.2%
Resi10		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	40.7%	5.7%	24.3%	34.5%	40.7%	47.7%	47.0%	45.7%	50.0%
SA Property		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	14.3%	2.3%	6.5%	10.5%	14.3%	17.2%	20.8%	23.5%	25.1%
SWIX Top40		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	11.2%	-2.0%	3.1%	7.2%	11.2%	7.9%	12.2%	20.3%	23.2%
Top40		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	21.6%	-6.7%	6.6%	14.8%	21.6%	33.4%	39.5%	47.1%	41.3%

Instrument	Currencies								
AUD/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	5.5%	-0.1%	1.8%	3.3%	5.5%	7.4%	8.8%	10.0%	9.9%
BWP/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	-2.3%	-1.2%	-1.5%	-1.9%	-2.3%	-2.4%	-2.4%	-2.4%	-2.4%
CAD/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	4.0%	-0.1%	0.9%	2.6%	4.0%	6.3%	8.7%	10.5%	11.4%
CHF/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	6.1%	-0.3%	1.6%	4.1%	6.1%	5.6%	7.8%	8.8%	10.7%
CNY/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	1.8%	0.2%	0.7%	0.9%	1.8%	2.6%	3.5%	4.1%	4.3%
EUR/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	10.2%	2.0%	5.3%	8.5%	10.2%	13.3%	14.3%	15.3%	16.4%
GBP/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	13.9%	3.1%	7.6%	11.5%	13.9%	15.8%	15.8%	16.5%	17.7%
NZD/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	8.6%	1.1%	3.3%	6.5%	8.6%	10.6%	12.0%	13.8%	14.2%
TKL/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	2.5%	0.8%	2.8%	4.5%	2.5%	5.0%	7.6%	8.6%	10.3%
USD/ZAR		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	10.7%	1.7%	5.5%	8.2%	10.7%	11.6%	12.0%	13.2%	13.4%
ZAR/JPY		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	6.7%	2.1%	5.8%	5.1%	6.7%	9.9%	13.6%	13.3%	14.8%

Instrument	Agriculture								
Coffee		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	46.7%	10.2%	19.3%	39.5%	46.7%	50.8%	57.3%	65.8%	69.1%
Corn		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	66.3%	18.3%	32.5%	46.3%	66.3%	84.1%	94.6%	105.4%	113.3%
Cotton		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	63.7%	8.2%	38.5%	53.8%	63.7%	72.2%	103.0%	119.0%	94.5%
Soya Beans		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	28.9%	2.8%	15.1%	23.2%	28.9%	32.0%	34.5%	37.2%	38.8%
Sugar		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	57.8%	16.6%	32.8%	46.8%	57.8%	85.6%	105.3%	103.4%	107.7%
Sunflower Seeds		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	63.0%	19.5%	44.8%	55.6%	63.0%	69.0%	73.7%	78.5%	81.3%
Wheat		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	50.7%	11.5%	30.3%	40.8%	50.7%	58.9%	66.0%	71.2%	75.5%
White Maize		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	46.2%	8.8%	28.7%	39.5%	46.2%	52.3%	56.4%	59.7%	62.7%
Yellow Maize		Number of pyramids							
	CAGR	1	2	3	4	5	6	7	8
	46.0%	10.4%	30.1%	40.5%	46.0%	50.8%	55.1%	58.0%	60.7%

8.6. Optimal trend determinant points

Instrument	Precious Metals

Copper

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	449	# days LONG	521	# days LONG	461
# days SHORT	334	# days SHORT	380	# days SHORT	346
Total trade days	**783**	Total trade days	**901**	Total trade days	**807**
Total # trades	175	Total # trades	108	Total # trades	170
Average position length	**4.5**	Average position length	**8.3**	Average position length	**4.7**

Gold

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	574	# days LONG	659	# days LONG	578
# days SHORT	333	# days SHORT	209	# days SHORT	344
Total trade days	**907**	Total trade days	**868**	Total trade days	**922**
Total # trades	88	Total # trades	23	Total # trades	87
Average position length	**10.3**	Average position length	**37.7**	Average position length	**10.6**

Palladium

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	565	# days LONG	569	# days LONG	565
# days SHORT	292	# days SHORT	347	# days SHORT	273
Total trade days	**857**	Total trade days	**916**	Total trade days	**838**
Total # trades	90	Total # trades	30	Total # trades	89
Average position length	**9.5**	Average position length	**30.5**	Average position length	**9.4**

Platinum

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	584	# days LONG	563	# days LONG	585
# days SHORT	385	# days SHORT	313	# days SHORT	393
Total trade days	**969**	Total trade days	**876**	Total trade days	**978**
Total # trades	91	Total # trades	30	Total # trades	90
Average position length	**10.6**	Average position length	**29.2**	Average position length	**10.9**

Silver

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	606	# days LONG	545	# days LONG	607
# days SHORT	303	# days SHORT	296	# days SHORT	309
Total trade days	**909**	Total trade days	**841**	Total trade days	**916**
Total # trades	86	Total # trades	27	Total # trades	84
Average position length	**10.6**	Average position length	**31.1**	Average position length	**10.9**

Instrument	Energy

Brent Crude

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	1378	# days LONG	1593	# days LONG	1385
# days SHORT	887	# days SHORT	800	# days SHORT	939
Total trade days	**2265**	Total trade days	**2393**	Total trade days	**2324**
Total # trades	248	Total # trades	75	Total # trades	243
Average position length	**9.1**	Average position length	**31.9**	Average position length	**9.6**

Gasoline

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	502	# days LONG	558	# days LONG	512
# days SHORT	367	# days SHORT	349	# days SHORT	368
Total trade days	**869**	Total trade days	**907**	Total trade days	**880**
Total # trades	94	Total # trades	22	Total # trades	90
Average position length	**9.2**	Average position length	**41.2**	Average position length	**9.8**

Heating Oil

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	611	# days LONG	720	# days LONG	612
# days SHORT	372	# days SHORT	346	# days SHORT	384
Total trade days	**983**	Total trade days	**1066**	Total trade days	**996**
Total # trades	112	Total # trades	31	Total # trades	111
Average position length	**8.8**	Average position length	**34.4**	Average position length	**9.0**

Natural Gas

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	469	# days LONG	556	# days LONG	481
# days SHORT	558	# days SHORT	500	# days SHORT	561
Total trade days	**1027**	Total trade days	**1056**	Total trade days	**1042**
Total # trades	107	Total # trades	32	Total # trades	105
Average position length	**9.6**	Average position length	**33.0**	Average position length	**9.9**

WTIA

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	499	# days LONG	629	# days LONG	502
# days SHORT	318	# days SHORT	275	# days SHORT	334
Total trade days	**817**	Total trade days	**904**	Total trade days	**836**
Total # trades	100	Total # trades	24	Total # trades	98
Average position length	**8.2**	Average position length	**37.7**	Average position length	**8.5**

Instrument	Equity Indices

African Banks

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	698	# days LONG	984	# days LONG	693
# days SHORT	475	# days SHORT	418	# days SHORT	488
Total trade days	**1173**	Total trade days	**1402**	Total trade days	**1181**
Total # trades	133	Total # trades	40	Total # trades	132
Average position length	**8.8**	Average position length	**35.1**	Average position length	**8.9**

ALSI

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	905	# days LONG	1134	# days LONG	931
# days SHORT	401	# days SHORT	361	# days SHORT	449
Total trade days	**1306**	Total trade days	**1495**	Total trade days	**1380**
Total # trades	146	Total # trades	41	Total # trades	141
Average position length	**8.9**	Average position length	**36.5**	Average position length	**9.8**

Capped Top40

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	813	# days LONG	967	# days LONG	826
# days SHORT	352	# days SHORT	327	# days SHORT	374
Total trade days	**1165**	Total trade days	**1294**	Total trade days	**1200**
Total # trades	143	Total # trades	39	Total # trades	139
Average position length	**8.1**	Average position length	**33.2**	Average position length	**8.6**

DiviPlus

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	436	# days LONG	449	# days LONG	445
# days SHORT	258	# days SHORT	279	# days SHORT	276
Total trade days	**694**	Total trade days	**728**	Total trade days	**721**
Total # trades	81	Total # trades	22	Total # trades	76
Average position length	**8.6**	Average position length	**33.1**	Average position length	**9.5**

Fin15

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	769	# days LONG	969	# days LONG	797
# days SHORT	437	# days SHORT	470	# days SHORT	433
Total trade days	**1206**	Total trade days	**1439**	Total trade days	**1230**
Total # trades	138	Total # trades	44	Total # trades	132
Average position length	**8.7**	Average position length	**32.7**	Average position length	**9.3**

Findi30

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	907	# days LONG	1154	# days LONG	943
# days SHORT	362	# days SHORT	344	# days SHORT	377
Total trade days	**1269**	Total trade days	**1498**	Total trade days	**1320**
Total # trades	150	Total # trades	41	Total # trades	143
Average position length	**8.5**	Average position length	**36.5**	Average position length	**9.2**

General Retailers

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	981	# days LONG	1101	# days LONG	1008
# days SHORT	466	# days SHORT	367	# days SHORT	509
Total trade days	**1447**	Total trade days	**1468**	Total trade days	**1517**
Total # trades	123	Total # trades	33	Total # trades	116
Average position length	**11.8**	Average position length	**44.5**	Average position length	**13.1**

	Trend finder determinanants					
	System 1		System 2		Full System	
Gold Miners	# days LONG	605	# days LONG	674	# days LONG	612
	# days SHORT	637	# days SHORT	567	# days SHORT	658
	Total trade days	**1242**	Total trade days	**1241**	Total trade days	**1270**
	Total # trades	159	Total # trades	50	Total # trades	155
	Average position length	**7.8**	Average position length	**24.8**	Average position length	**8.2**
	Trend finder determinanants					
	System 1		System 2		Full System	
Indi25	# days LONG	1006	# days LONG	1176	# days LONG	1020
	# days SHORT	376	# days SHORT	300	# days SHORT	382
	Total trade days	**1382**	Total trade days	**1476**	Total trade days	**1402**
	Total # trades	142	Total # trades	42	Total # trades	138
	Average position length	**9.7**	Average position length	**35.1**	Average position length	**10.2**
	Trend finder determinanants					
	System 1		System 2		Full System	
MidCap60	# days LONG	1076	# days LONG	1174	# days LONG	1086
	# days SHORT	414	# days SHORT	412	# days SHORT	451
	Total trade days	**1490**	Total trade days	**1586**	Total trade days	**1537**
	Total # trades	121	Total # trades	33	Total # trades	115
	Average position length	**12.3**	Average position length	**48.1**	Average position length	**13.4**
	Trend finder determinanants					
	System 1		System 2		Full System	
Resi10	# days LONG	751	# days LONG	908	# days LONG	768
	# days SHORT	520	# days SHORT	466	# days SHORT	533
	Total trade days	**1271**	Total trade days	**1374**	Total trade days	**1301**
	Total # trades	148	Total # trades	43	Total # trades	147
	Average position length	**8.6**	Average position length	**32.0**	Average position length	**8.9**
	Trend finder determinanants					
	System 1		System 2		Full System	
SA Property	# days LONG	799	# days LONG	776	# days LONG	809
	# days SHORT	353	# days SHORT	324	# days SHORT	401
	Total trade days	**1152**	Total trade days	**1100**	Total trade days	**1210**
	Total # trades	86	Total # trades	30	Total # trades	77
	Average position length	**13.4**	Average position length	**36.7**	Average position length	**15.7**
	Trend finder determinanants					
	System 1		System 2		Full System	
SWIX Top40	# days LONG	805	# days LONG	1031	# days LONG	817
	# days SHORT	334	# days SHORT	320	# days SHORT	352
	Total trade days	**1139**	Total trade days	**1351**	Total trade days	**1169**
	Total # trades	147	Total # trades	39	Total # trades	141
	Average position length	**7.7**	Average position length	**34.6**	Average position length	**8.3**
	Trend finder determinanants					
	System 1		System 2		Full System	
Top40	# days LONG	904	# days LONG	1100	# days LONG	932
	# days SHORT	397	# days SHORT	355	# days SHORT	433
	Total trade days	**1301**	Total trade days	**1455**	Total trade days	**1365**
	Total # trades	160	Total # trades	44	Total # trades	153
	Average position length	**8.1**	Average position length	**33.1**	Average position length	**8.9**

Instrument	Currencies

AUD/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	1108	# days LONG	1183	# days LONG	1133
# days SHORT	1063	# days SHORT	857	# days SHORT	1132
Total trade days	**2171**	Total trade days	**2040**	Total trade days	**2265**
Total # trades	512	Total # trades	339	Total # trades	505
Average position length	**4.2**	Average position length	**6.0**	Average position length	**4.5**

BWP/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	255	# days LONG	338	# days LONG	264
# days SHORT	542	# days SHORT	685	# days SHORT	550
Total trade days	**797**	Total trade days	**1023**	Total trade days	**814**
Total # trades	2469	Total # trades	2391	Total # trades	2467
Average position length	**0.3**	Average position length	**0.4**	Average position length	**0.3**

CAD/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	921	# days LONG	1186	# days LONG	931
# days SHORT	878	# days SHORT	695	# days SHORT	881
Total trade days	**1799**	Total trade days	**1881**	Total trade days	**1812**
Total # trades	1007	Total # trades	865	Total # trades	1004
Average position length	**1.8**	Average position length	**2.2**	Average position length	**1.8**

CHF/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	965	# days LONG	1246	# days LONG	982
# days SHORT	1000	# days SHORT	964	# days SHORT	1037
Total trade days	**1965**	Total trade days	**2210**	Total trade days	**2019**
Total # trades	514	Total # trades	333	Total # trades	507
Average position length	**3.8**	Average position length	**6.6**	Average position length	**4.0**

CNY/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	434	# days LONG	509	# days LONG	438
# days SHORT	430	# days SHORT	344	# days SHORT	437
Total trade days	**864**	Total trade days	**853**	Total trade days	**875**
Total # trades	2712	Total # trades	2646	Total # trades	2711
Average position length	**0.3**	Average position length	**0.3**	Average position length	**0.3**

EUR/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	837	# days LONG	1059	# days LONG	838
# days SHORT	1013	# days SHORT	953	# days SHORT	1040
Total trade days	**1850**	Total trade days	**2012**	Total trade days	**1878**
Total # trades	990	Total # trades	843	Total # trades	987
Average position length	**1.9**	Average position length	**2.4**	Average position length	**1.9**

GBP/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	1075	# days LONG	1296	# days LONG	1065
# days SHORT	1251	# days SHORT	982	# days SHORT	1269
Total trade days	**2326**	Total trade days	**2278**	Total trade days	**2334**
Total # trades	474	Total # trades	335	Total # trades	474
Average position length	**4.9**	Average position length	**6.8**	Average position length	**4.9**

NZD/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	655	# days LONG	776	# days LONG	663
# days SHORT	639	# days SHORT	548	# days SHORT	650
Total trade days	**1294**	Total trade days	**1324**	Total trade days	**1313**
Total # trades	1960	Total # trades	1868	Total # trades	1958
Average position length	**0.7**	Average position length	**0.7**	Average position length	**0.7**

TKL/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	494	# days LONG	428	# days LONG	504
# days SHORT	449	# days SHORT	401	# days SHORT	450
Total trade days	**943**	Total trade days	**829**	Total trade days	**954**
Total # trades	2701	Total # trades	2639	Total # trades	2701
Average position length	**0.3**	Average position length	**0.3**	Average position length	**0.4**

USD/ZAR

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	1227	# days LONG	1573	# days LONG	1271
# days SHORT	1180	# days SHORT	990	# days SHORT	1192
Total trade days	**2407**	Total trade days	**2563**	Total trade days	**2463**
Total # trades	233	Total # trades	73	Total # trades	232
Average position length	**10.3**	Average position length	**35.1**	Average position length	**10.6**

ZAR/JPY

Trend finder determinanants					
System 1		System 2		Full System	
# days LONG	956	# days LONG	943	# days LONG	980
# days SHORT	851	# days SHORT	1123	# days SHORT	834
Total trade days	**1807**	Total trade days	**2066**	Total trade days	**1814**
Total # trades	1005	Total # trades	851	Total # trades	1003
Average position length	**1.8**	Average position length	**2.4**	Average position length	**1.8**

Instrument	Agriculture

Coffee

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	490	# days LONG	311	# days LONG	486
# days SHORT	417	# days SHORT	175	# days SHORT	425
Total trade days	**907**	Total trade days	**486**	Total trade days	**911**
Total # trades	121	Total # trades	67	Total # trades	120
Average position length	**7.5**	Average position length	**7.3**	Average position length	**7.6**

Corn

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	619	# days LONG	476	# days LONG	752
# days SHORT	397	# days SHORT	185	# days SHORT	494
Total trade days	**1016**	Total trade days	**661**	Total trade days	**1246**
Total # trades	109	Total # trades	65	Total # trades	87
Average position length	**9.3**	Average position length	**10.2**	Average position length	**14.3**

Cotton

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	530	# days LONG	592	# days LONG	539
# days SHORT	413	# days SHORT	374	# days SHORT	431
Total trade days	**943**	Total trade days	**966**	Total trade days	**970**
Total # trades	116	Total # trades	36	Total # trades	111
Average position length	**8.1**	Average position length	**26.8**	Average position length	**8.7**

Soya Beans

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	1223	# days LONG	1326	# days LONG	1279
# days SHORT	1061	# days SHORT	1083	# days SHORT	1104
Total trade days	**2284**	Total trade days	**2409**	Total trade days	**2383**
Total # trades	260	Total # trades	83	Total # trades	251
Average position length	**8.8**	Average position length	**29.0**	Average position length	**9.5**

Sugar

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	548	# days LONG	675	# days LONG	553
# days SHORT	442	# days SHORT	318	# days SHORT	461
Total trade days	**990**	Total trade days	**993**	Total trade days	**1014**
Total # trades	105	Total # trades	25	Total # trades	104
Average position length	**9.4**	Average position length	**39.7**	Average position length	**9.8**

Sunflower Seeds

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	863	# days LONG	825	# days LONG	860
# days SHORT	634	# days SHORT	642	# days SHORT	671
Total trade days	**1497**	Total trade days	**1467**	Total trade days	**1531**
Total # trades	131	Total # trades	39	Total # trades	127
Average position length	**11.4**	Average position length	**37.6**	Average position length	**12.1**

Wheat

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	717	# days LONG	801	# days LONG	744
# days SHORT	490	# days SHORT	565	# days SHORT	501
Total trade days	**1207**	Total trade days	**1366**	Total trade days	**1245**
Total # trades	141	Total # trades	42	Total # trades	140
Average position length	**8.6**	Average position length	**32.5**	Average position length	**8.9**

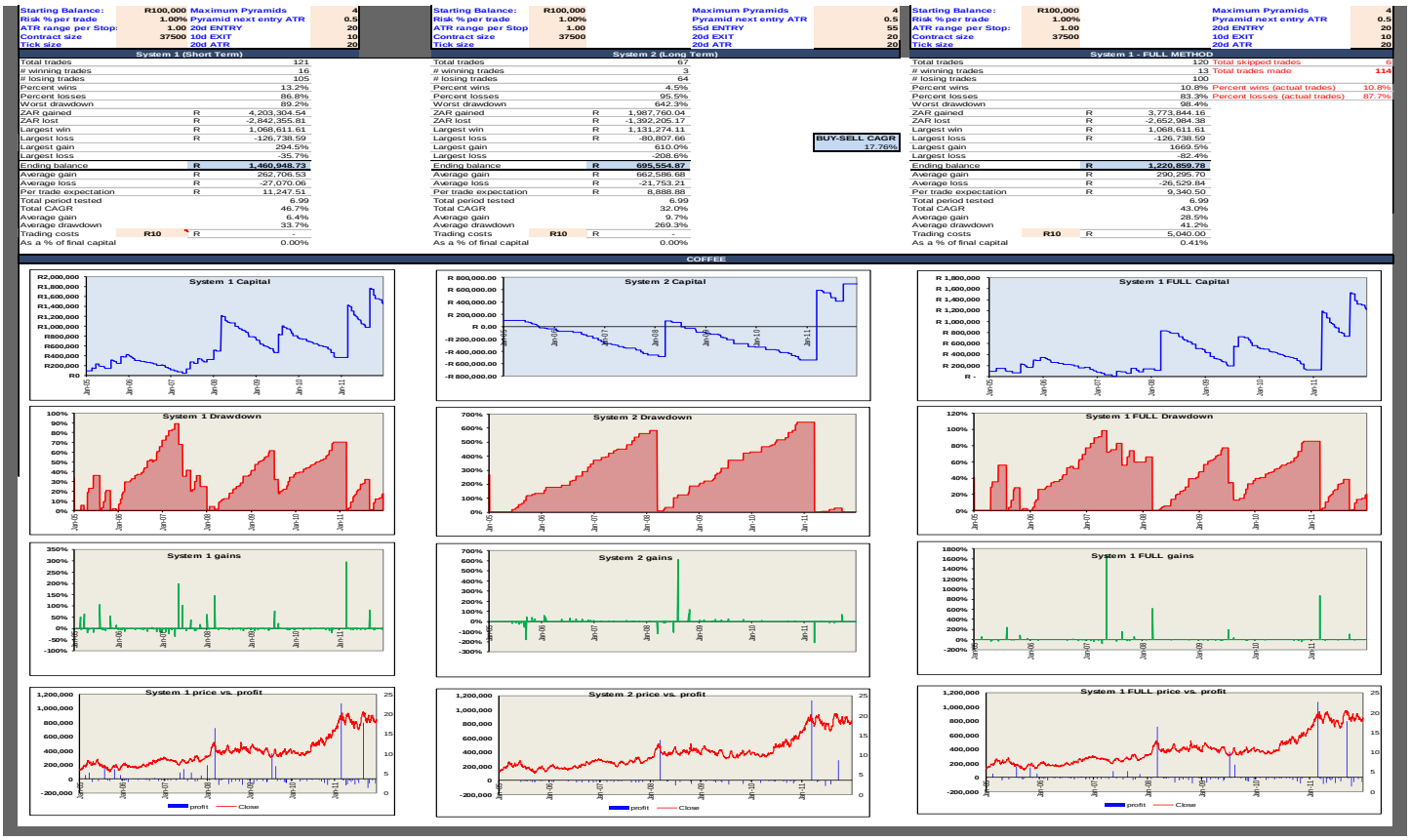
White Maize

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	998	# days LONG	1102	# days LONG	1029
# days SHORT	710	# days SHORT	632	# days SHORT	744
Total trade days	**1708**	Total trade days	**1734**	Total trade days	**1773**
Total # trades	193	Total # trades	52	Total # trades	183
Average position length	**8.8**	Average position length	**33.3**	Average position length	**9.7**

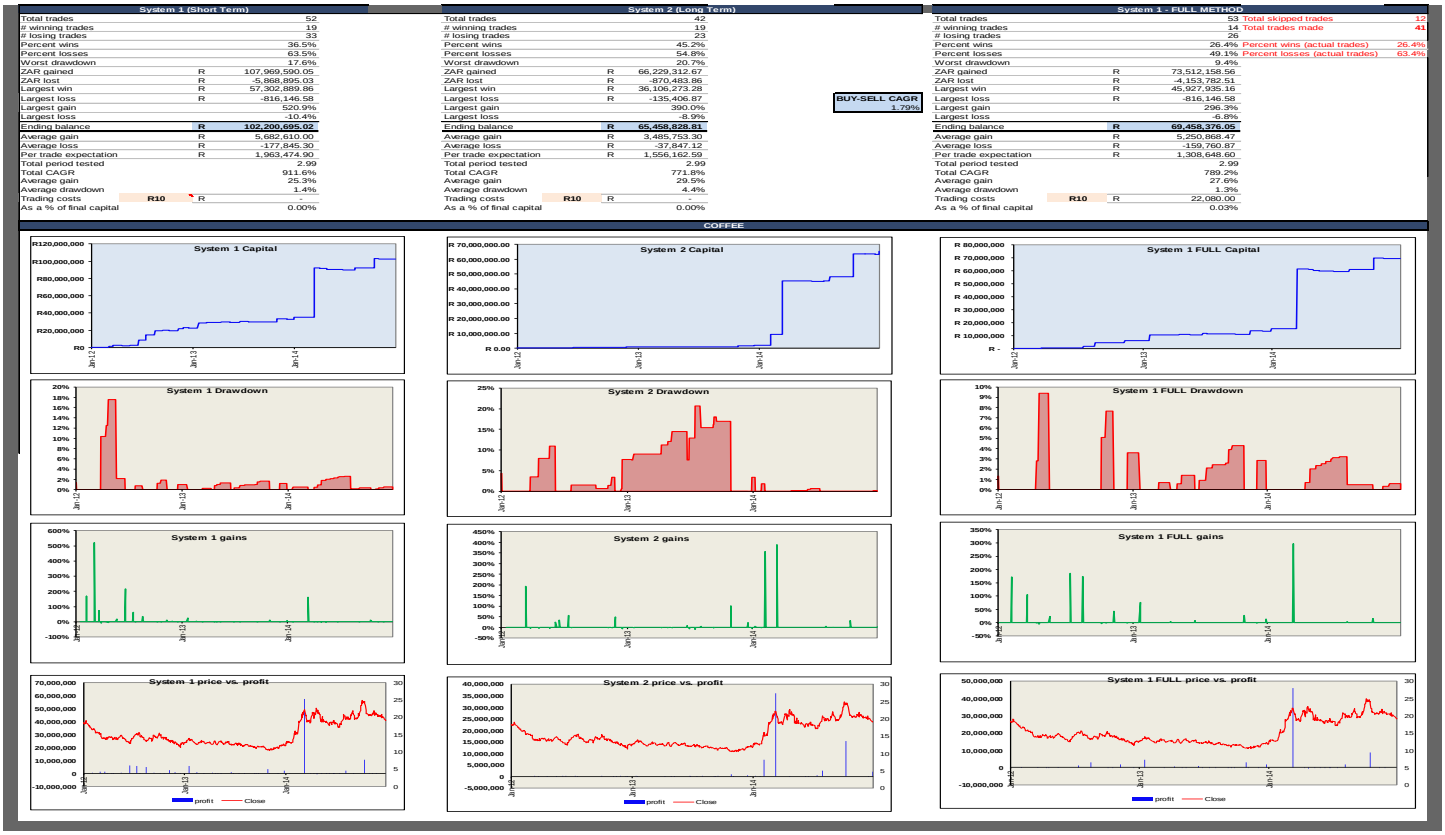
Yellow Maize

Trend finder determinanants					
System 1		**System 2**		**Full System**	
# days LONG	999	# days LONG	1096	# days LONG	1020
# days SHORT	708	# days SHORT	735	# days SHORT	733
Total trade days	**1707**	Total trade days	**1831**	Total trade days	**1753**
Total # trades	181	Total # trades	46	Total # trades	174
Average position length	**9.4**	Average position length	**39.8**	Average position length	**10.1**

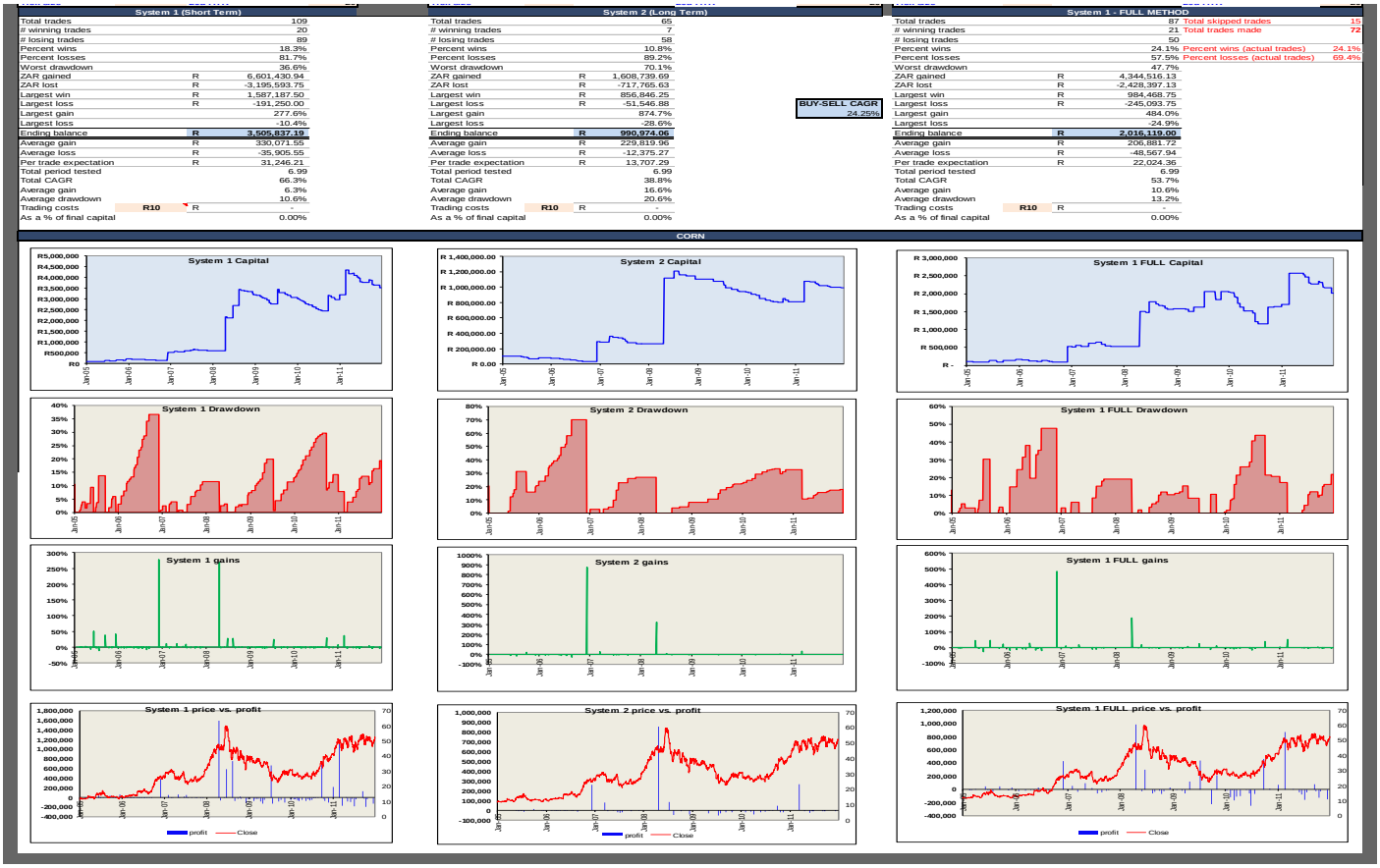
8.7. Detailed results



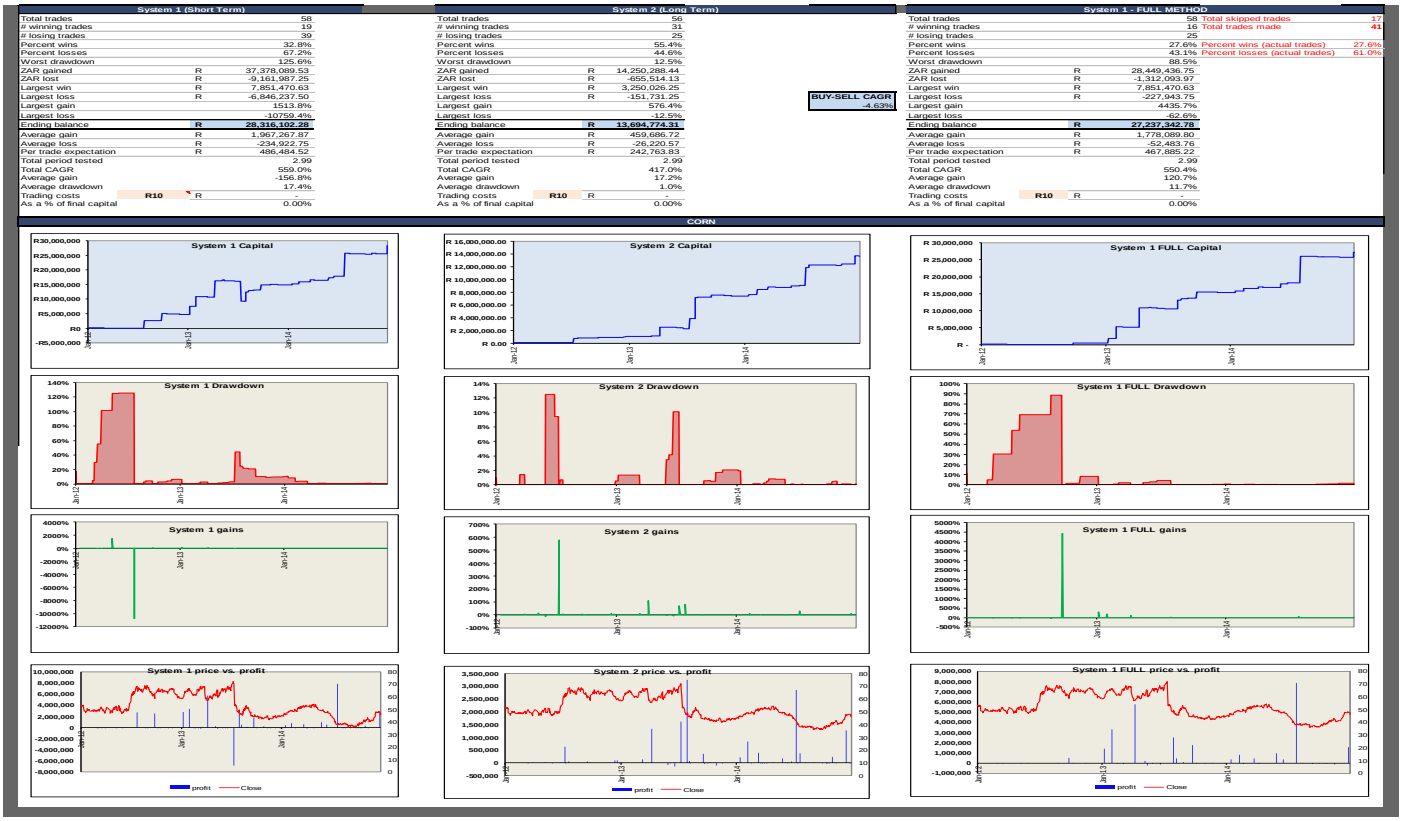
Out-of-sample results (2012-2014)



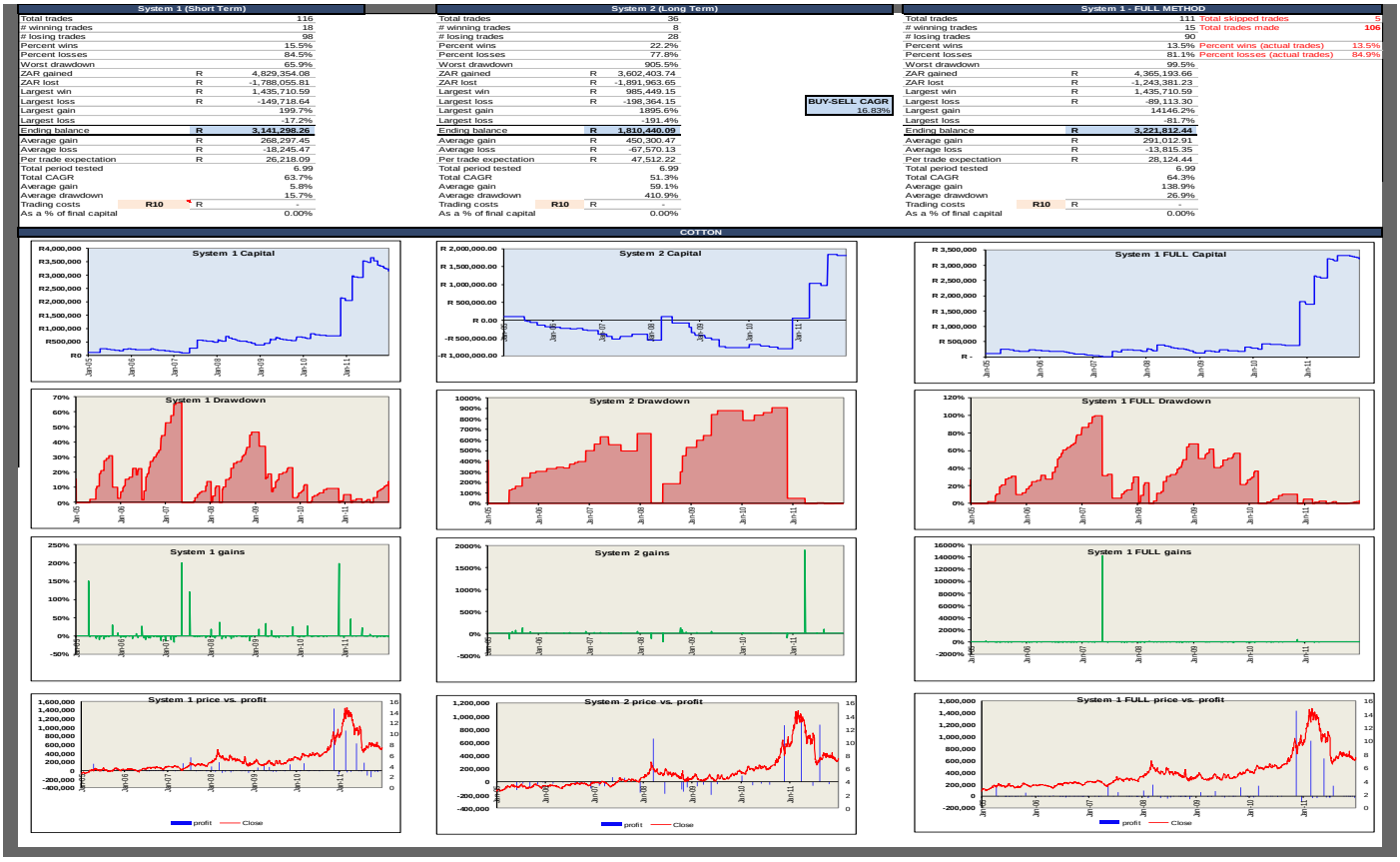
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)



Initial backtesting results (initial period)



System 1 (Short Term)		
Total trades		116
# winning trades		18
# losing trades		98
Percent wins		15.5%
Percent losses		84.5%
Worst drawdown		65.9%
ZAR gained	R	4,829,354.08
ZAR lost	R	-1,788,055.81
Largest win	R	1,435,710.59
Largest loss	R	-149,718.64
Largest gain		199.7%
Largest loss		-17.2%
Ending balance	R	3,141,298.26
Average gain	R	268,297.45
Average loss	R	-18,245.47
Per trade expectation	R	26,218.09
Total period tested		6.99
Total CAGR		63.7%
Average gain		5.8%
Average drawdown		15.7%
Trading costs	R10 R	-
As a % of final capital		0.00%

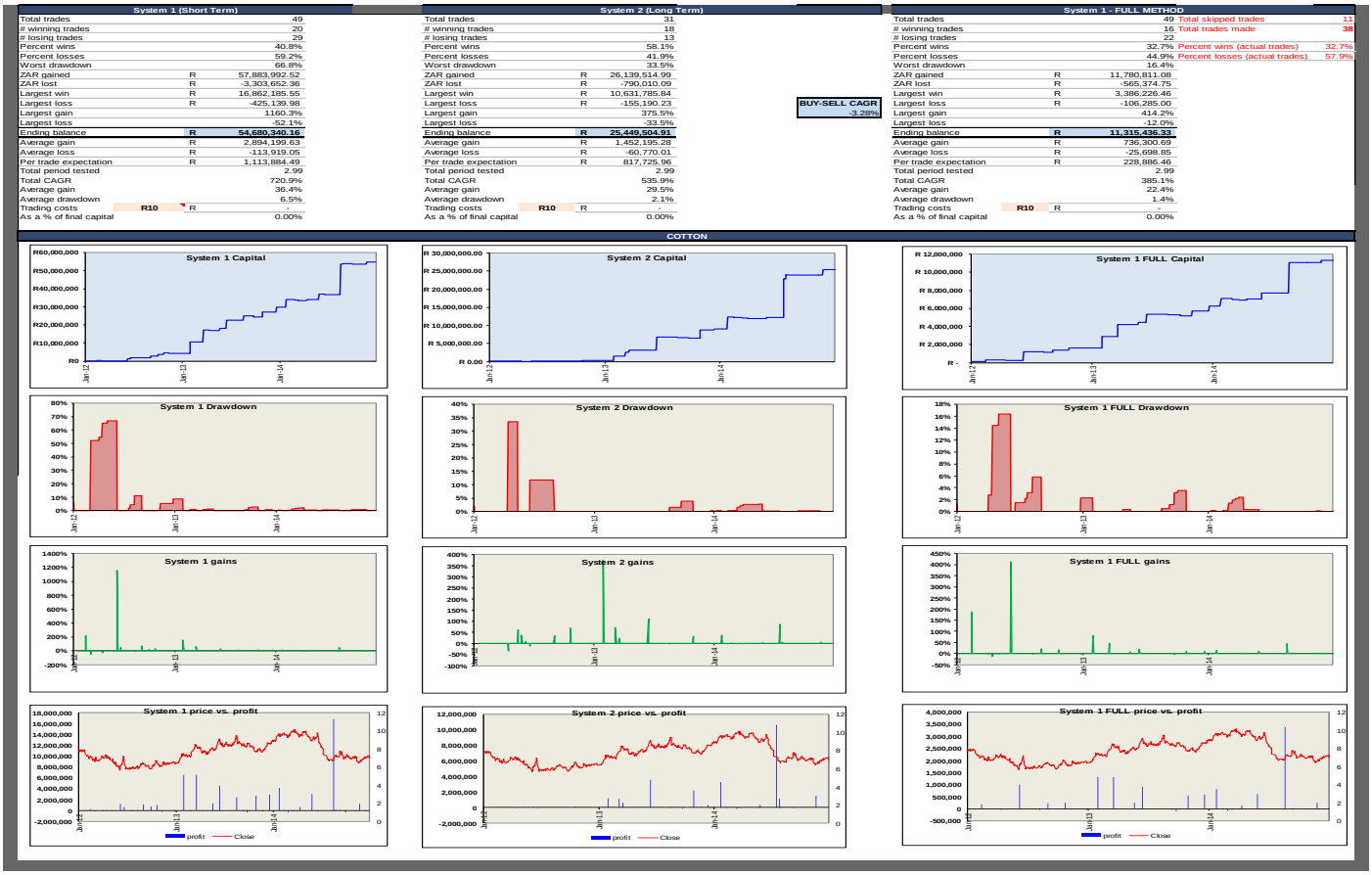
System 2 (Long Term)		
Total trades		30
# winning trades		8
# losing trades		28
Percent wins		22.2%
Percent losses		77.8%
Worst drawdown		905.5%
ZAR gained	R	3,602,403.74
ZAR lost	R	-1,891,963.65
Largest win	R	985,449.15
Largest loss	R	-198,364.15
Largest gain		1895.6%
Largest loss		-191.4%
Ending balance	R	1,810,440.09
Average gain	R	450,300.47
Average loss	R	-67,570.13
Per trade expectation	R	47,512.22
Total period tested		6.99
Total CAGR		51.3%
Average gain		59.1%
Average drawdown		410.9%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR 16.83%

System 1 - FULL METHOD				
Total trades		111	Total skipped trades	5
# winning trades		15	Total trades made	106
# losing trades		90		
Percent wins		13.5%	Percent wins (actual trades)	13.5%
Percent losses		81.1%	Percent losses (actual trades)	84.9%
Worst drawdown		99.5%		
ZAR gained	R	4,365,193.66		
ZAR lost	R	-1,243,381.23		
Largest win	R	1,435,710.59		
Largest loss	R	-89,113.30		
Largest gain		14146.2%		
Largest loss		-81.7%		
Ending balance	R	3,221,812.44		
Average gain	R	291,012.91		
Average loss	R	-13,815.35		
Per trade expectation	R	28,124.44		
Total period tested		6.99		
Total CAGR		64.3%		
Average gain		138.9%		
Average drawdown		26.9%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

COTTON

Out-of-sample results (2012-2014)



System 1 (Short Term)		
Total trades		49
# winning trades		20
# losing trades		29
Percent wins		40.8%
Percent losses		59.2%
Worst drawdown		66.8%
ZAR gained	R	57,883,992.52
ZAR lost	R	-3,303,652.36
Largest win	R	16,862,185.55
Largest loss	R	-425,139.98
Largest gain		1160.3%
Largest loss		-52.1%
Ending balance	R	54,680,340.16
Average gain	R	2,894,199.63
Average loss	R	-113,919.05
Per trade expectation	R	1,113,884.49
Total period tested		2.99
Total CAGR		720.9%
Average gain		36.4%
Average drawdown		6.5%
Trading costs	R10 R	-
As a % of final capital		0.00%

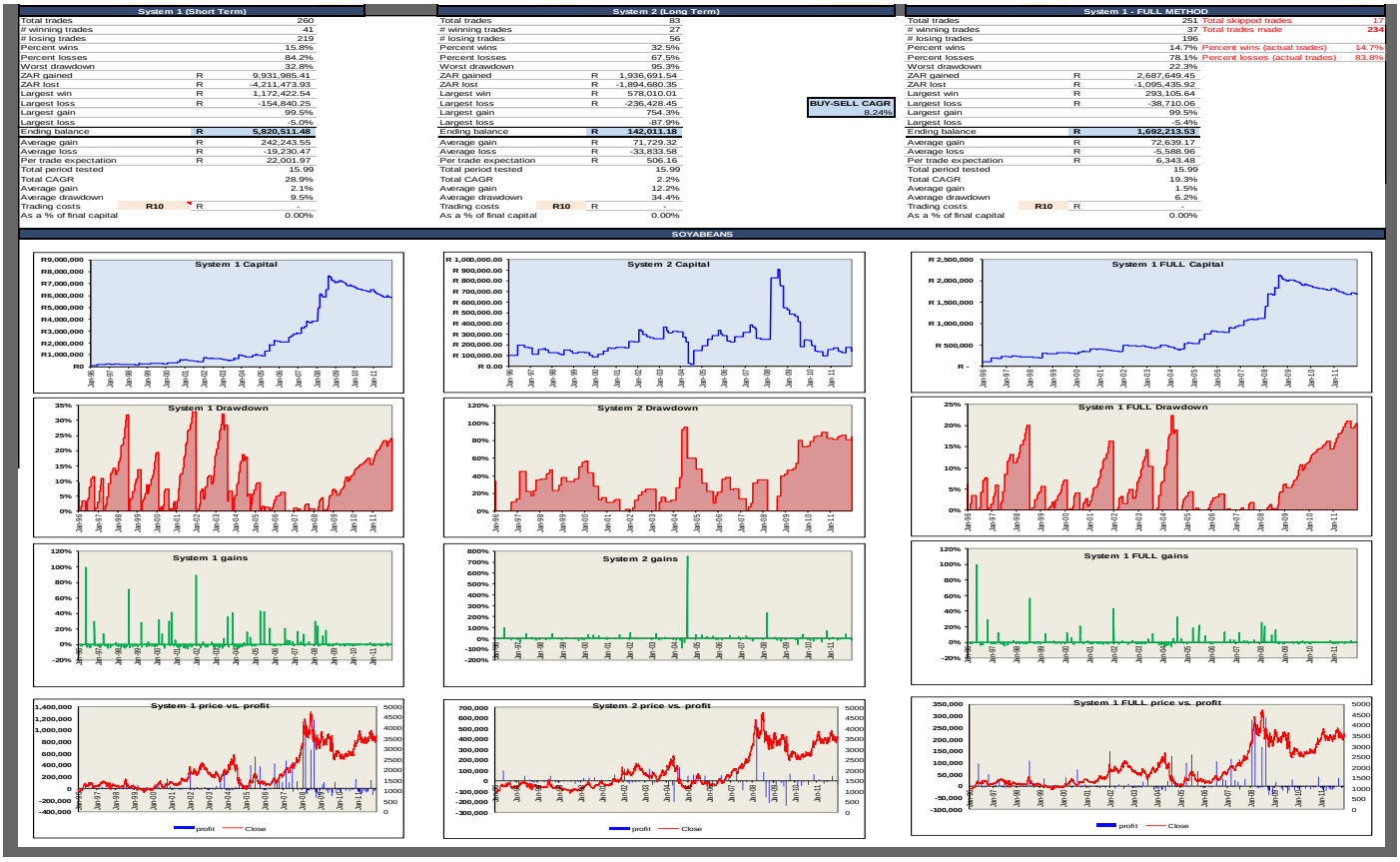
System 2 (Long Term)		
Total trades		31
# winning trades		18
# losing trades		13
Percent wins		58.1%
Percent losses		41.9%
Worst drawdown		33.5%
ZAR gained	R	26,139,514.99
ZAR lost	R	-790,010.09
Largest win	R	10,631,785.84
Largest loss	R	-155,190.23
Largest gain		375.5%
Largest loss		-33.5%
Ending balance	R	25,449,504.91
Average gain	R	1,452,195.28
Average loss	R	-60,770.01
Per trade expectation	R	817,725.96
Total period tested		2.99
Total CAGR		535.9%
Average gain		29.5%
Average drawdown		2.1%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR -3.28%

System 1 - FULL METHOD				
Total trades		49	Total skipped trades	11
# winning trades		16	Total trades made	38
# losing trades		22		
Percent wins		32.7%	Percent wins (actual trades)	32.7%
Percent losses		44.9%	Percent losses (actual trades)	57.9%
Worst drawdown		16.4%		
ZAR gained	R	11,780,811.08		
ZAR lost	R	-565,374.75		
Largest win	R	3,386,226.46		
Largest loss	R	-106,285.00		
Largest gain		414.2%		
Largest loss		-12.0%		
Ending balance	R	11,315,436.33		
Average gain	R	736,300.69		
Average loss	R	-25,698.85		
Per trade expectation	R	228,886.46		
Total period tested		2.99		
Total CAGR		385.1%		
Average gain		22.4%		
Average drawdown		1.4%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

COTTON

Initial backtesting results (initial period)



System 1 (Short Term)		
Total trades		260
# winning trades		41
# losing trades		219
Percent wins		15.8%
Percent losses		84.2%
Worst drawdown		32.8%
ZAR gained	R	9,931,985.41
ZAR lost	R	-4,211,473.93
Largest win	R	1,172,422.54
Largest loss	R	-154,840.25
Largest gain		99.5%
Largest loss		-5.0%
Ending balance	R	5,820,511.48
Average gain	R	242,243.55
Average loss	R	-19,230.47
Per trade expectation	R	22,001.97
Total period tested		15.99
Total CAGR		28.9%
Average gain		2.1%
Average drawdown		9.5%
Trading costs	R10 R	-
As a % of final capital		0.00%

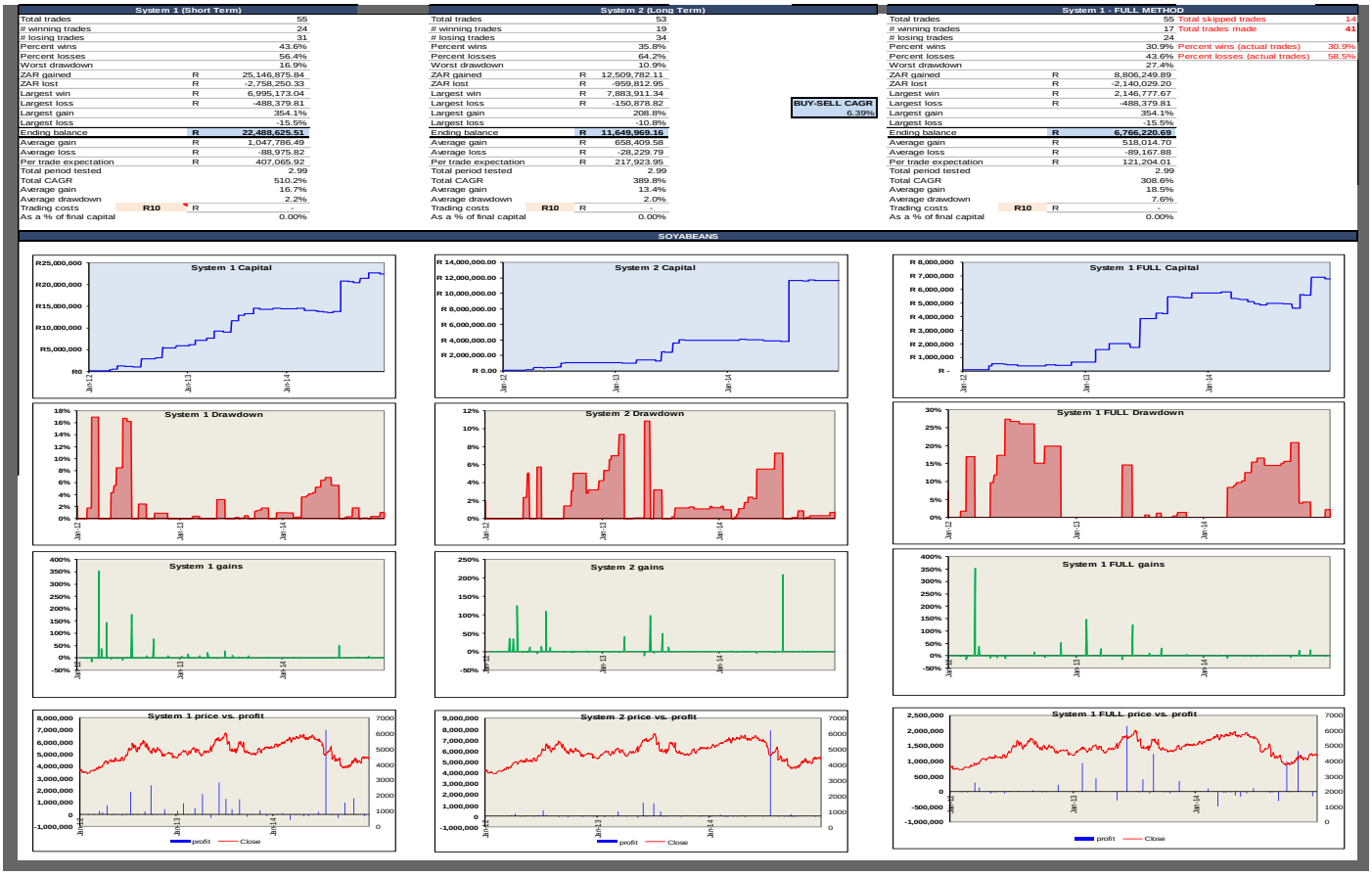
System 2 (Long Term)		
Total trades		83
# winning trades		27
# losing trades		56
Percent wins		32.5%
Percent losses		67.5%
Worst drawdown		95.3%
ZAR gained	R	1,936,691.54
ZAR lost	R	-1,894,680.35
Largest win	R	578,010.01
Largest loss	R	-236,428.45
Largest gain		754.3%
Largest loss		-87.9%
Ending balance	R	142,011.18
Average gain	R	71,729.32
Average loss	R	-33,833.58
Per trade expectation	R	506.16
Total period tested		15.99
Total CAGR		2.2%
Average gain		12.2%
Average drawdown		34.4%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR 8.24%

System 1 - FULL METHOD				
Total trades		251	Total skipped trades	17
# winning trades		37	Total trades made	234
# losing trades		196		
Percent wins		14.7%	Percent wins (actual trades)	14.7%
Percent losses		78.1%	Percent losses (actual trades)	83.8%
Worst drawdown		22.3%		
ZAR gained	R	2,687,649.45		
ZAR lost	R	-1,095,435.92		
Largest win	R	293,105.64		
Largest loss	R	-38,710.06		
Largest gain		99.5%		
Largest loss		-5.4%		
Ending balance	R	1,692,213.53		
Average gain	R	72,639.17		
Average loss	R	-5,588.96		
Per trade expectation	R	6,343.48		
Total period tested		15.99		
Total CAGR		19.3%		
Average gain		1.5%		
Average drawdown		6.2%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

SOYABEANS

Out-of-sample results (2012-2014)



System 1 (Short Term)		
Total trades		55
# winning trades		24
# losing trades		31
Percent wins		43.6%
Percent losses		56.4%
Worst drawdown		16.9%
ZAR gained	R	25,146,875.84
ZAR lost	R	-2,758,250.33
Largest win	R	6,995,173.04
Largest loss	R	-488,379.81
Largest gain		354.1%
Largest loss		-15.5%
Ending balance	R	22,488,625.51
Average gain	R	1,047,786.49
Average loss	R	-88,975.82
Per trade expectation	R	407,065.92
Total period tested		2.99
Total CAGR		510.2%
Average gain		16.7%
Average drawdown		2.2%
Trading costs	R10 R	-
As a % of final capital		0.00%

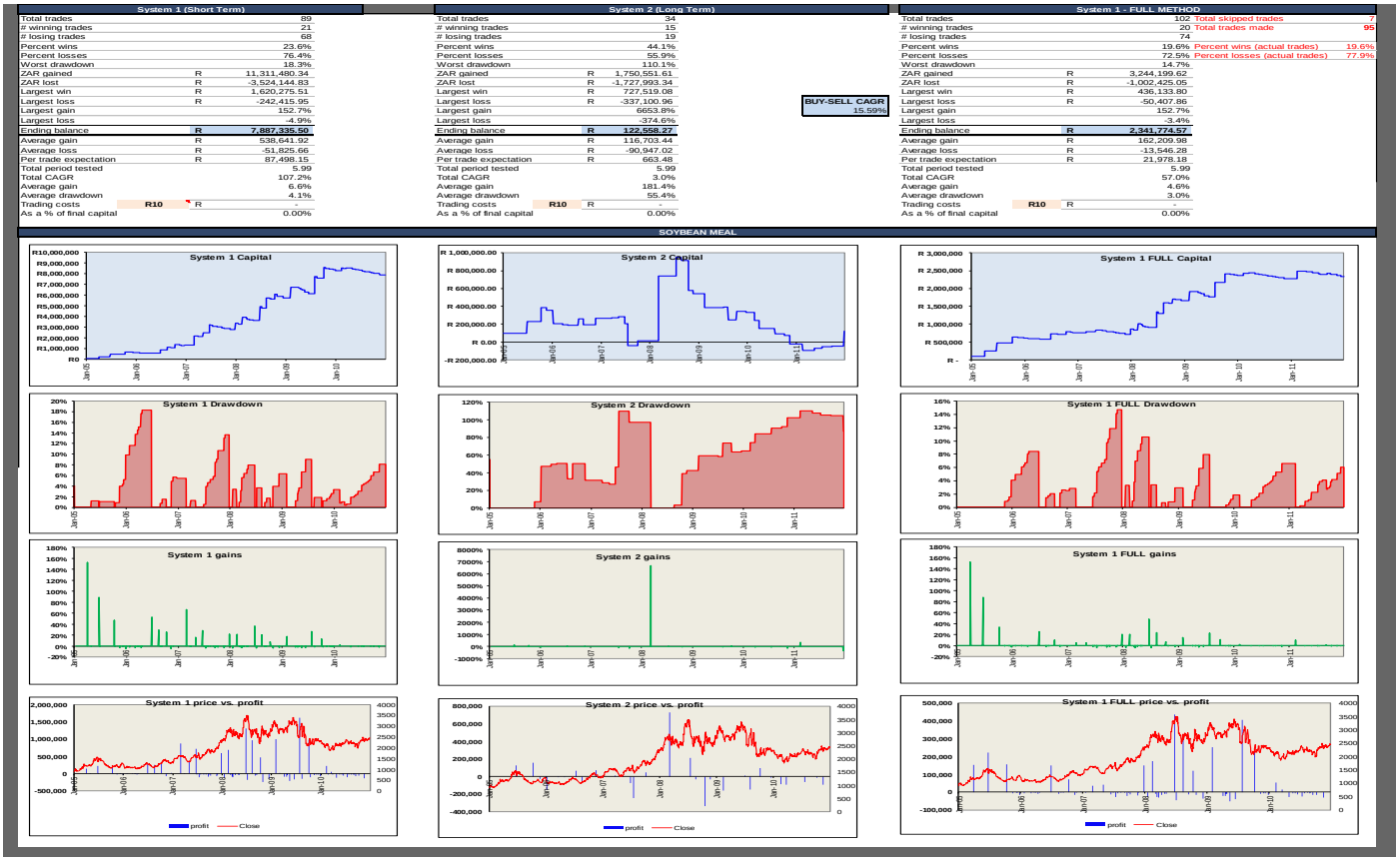
System 2 (Long Term)		
Total trades		53
# winning trades		19
# losing trades		34
Percent wins		35.8%
Percent losses		64.2%
Worst drawdown		10.9%
ZAR gained	R	12,509,782.11
ZAR lost	R	-959,812.95
Largest win	R	7,883,911.34
Largest loss	R	-150,878.82
Largest gain		208.8%
Largest loss		-10.8%
Ending balance	R	11,649,969.16
Average gain	R	658,409.58
Average loss	R	-28,229.79
Per trade expectation	R	217,923.95
Total period tested		2.99
Total CAGR		389.8%
Average gain		13.4%
Average drawdown		2.0%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR 6.39%

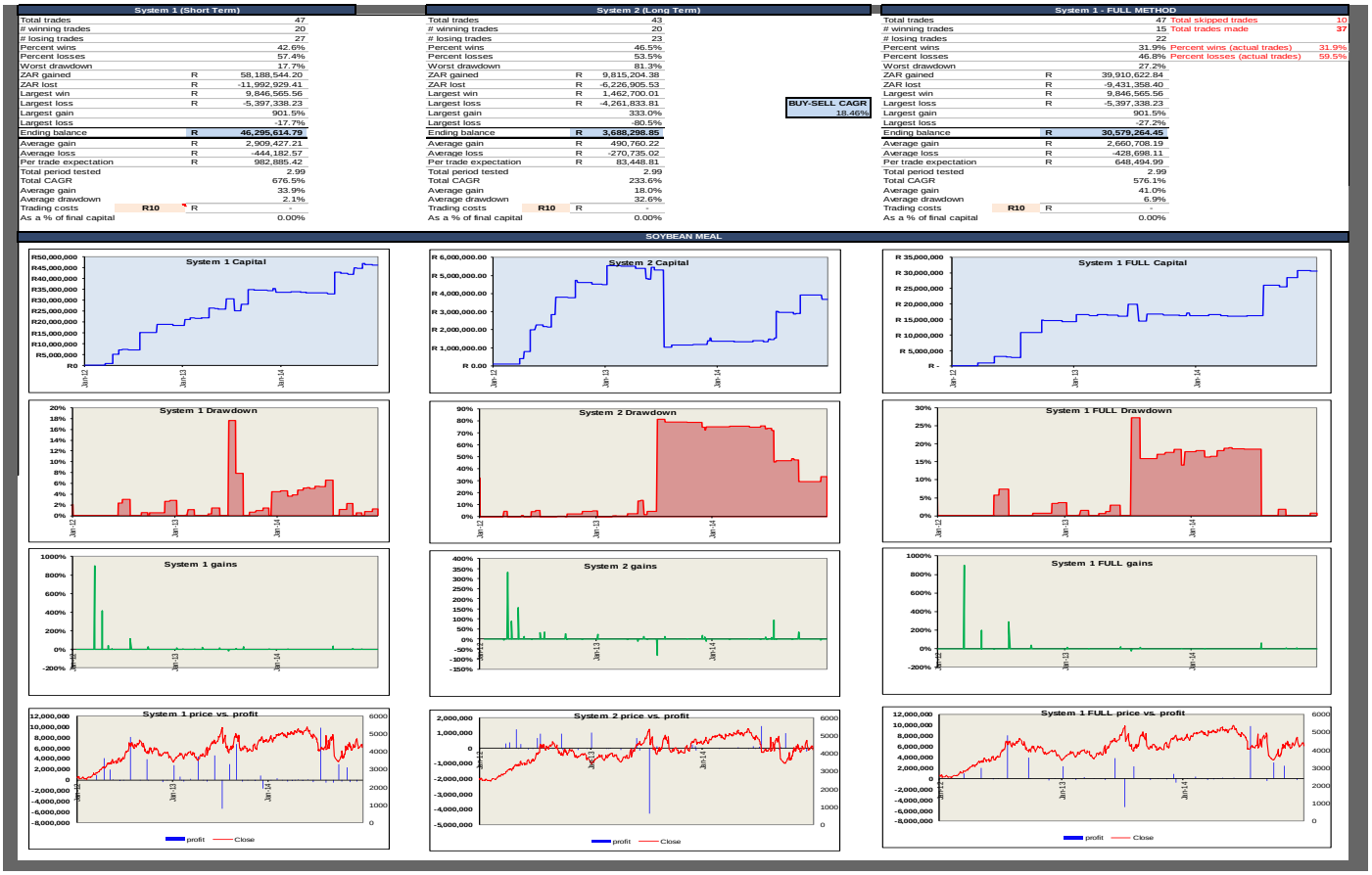
System 1 - FULL METHOD				
Total trades		55	Total skipped trades	14
# winning trades		17	Total trades made	41
# losing trades		24		
Percent wins		30.9%	Percent wins (actual trades)	30.9%
Percent losses		43.6%	Percent losses (actual trades)	58.5%
Worst drawdown		27.4%		
ZAR gained	R	8,806,249.89		
ZAR lost	R	-2,140,029.20		
Largest win	R	2,146,777.67		
Largest loss	R	-488,379.81		
Largest gain		354.1%		
Largest loss		-15.5%		
Ending balance	R	6,766,220.65		
Average gain	R	518,014.70		
Average loss	R	-89,167.88		
Per trade expectation	R	121,204.01		
Total period tested		2.99		
Total CAGR		308.6%		
Average gain		18.5%		
Average drawdown		7.6%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

SOYABEANS

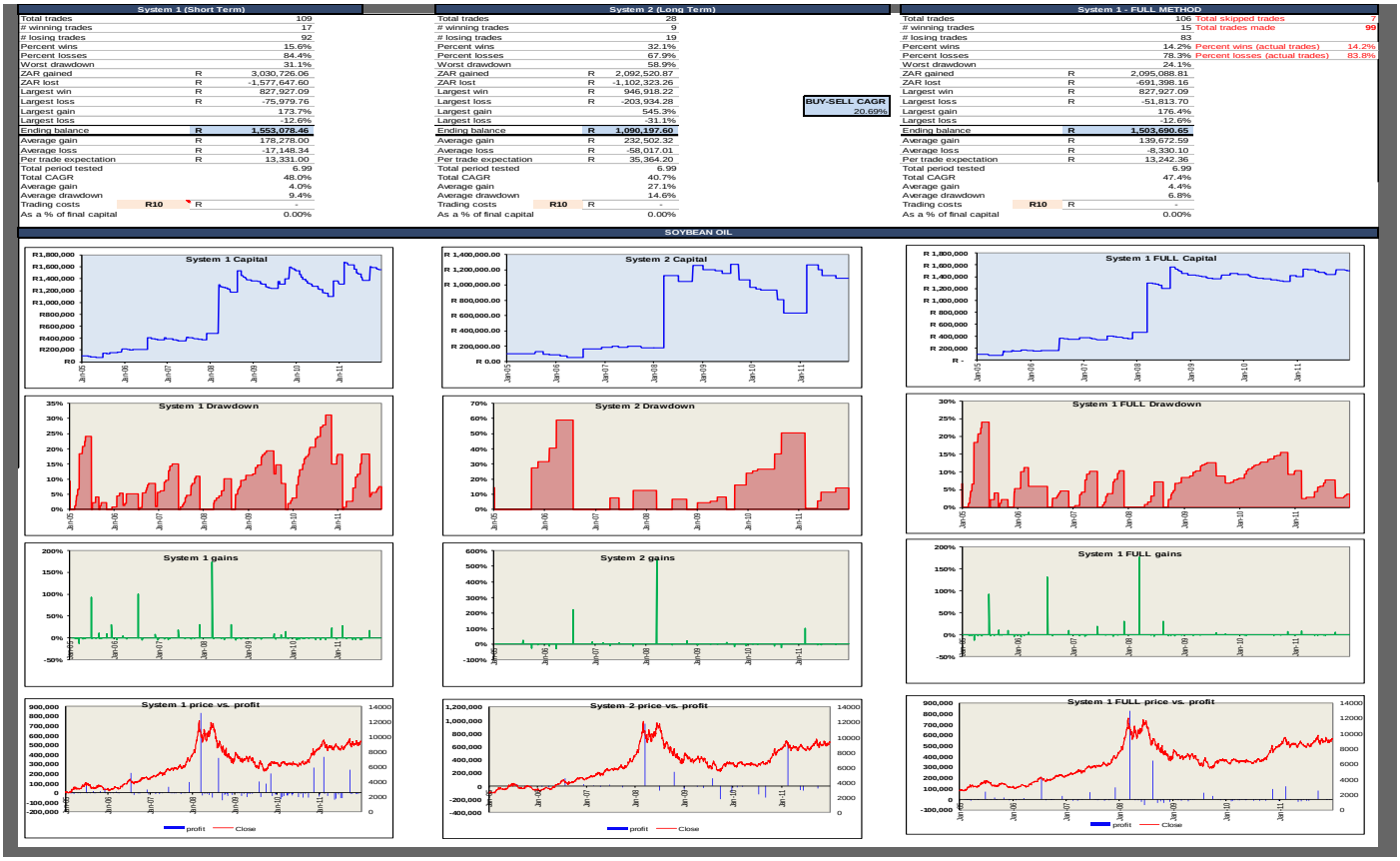
Initial backtesting results (initial period)



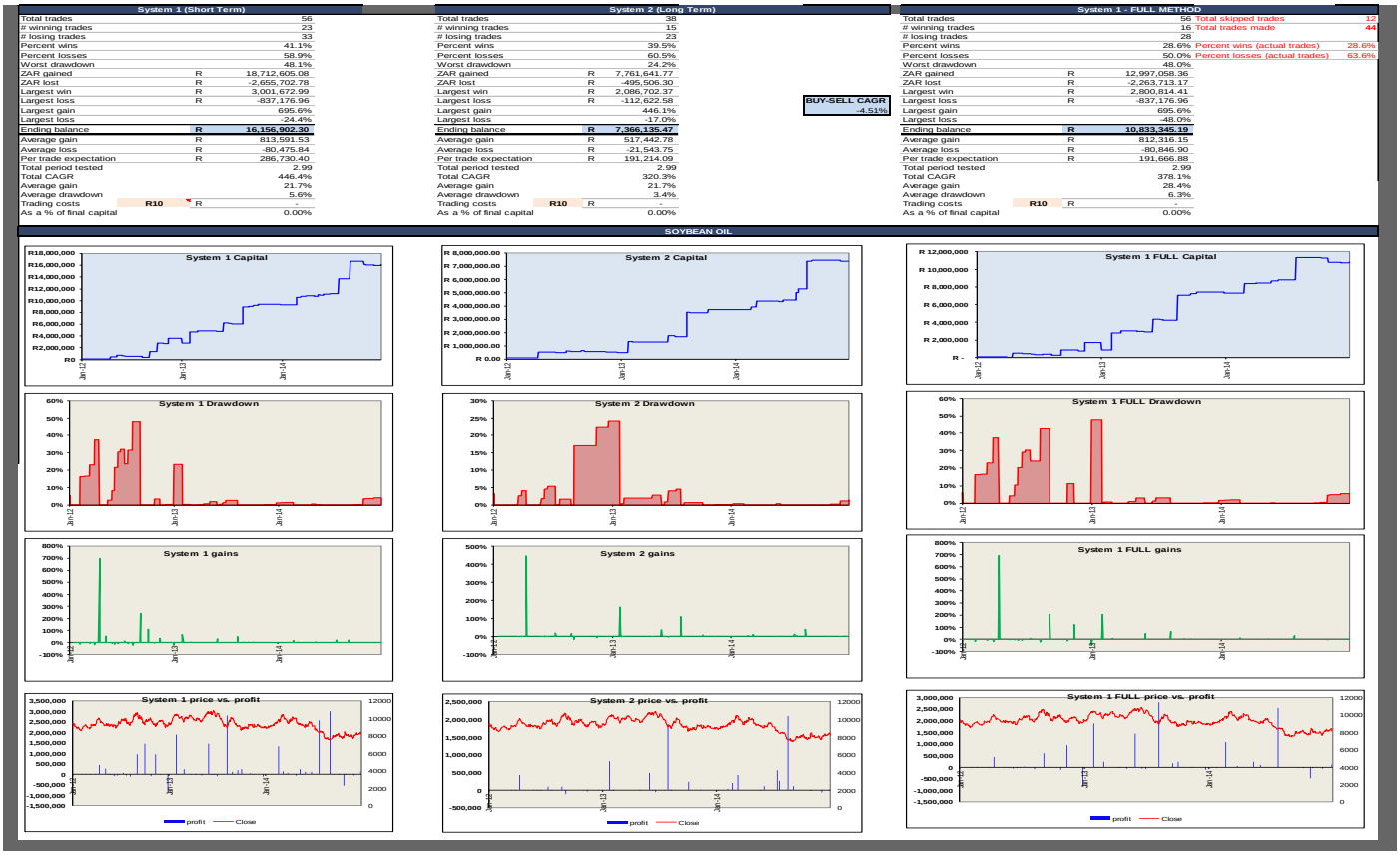
Out-of-sample results (2012-2014)



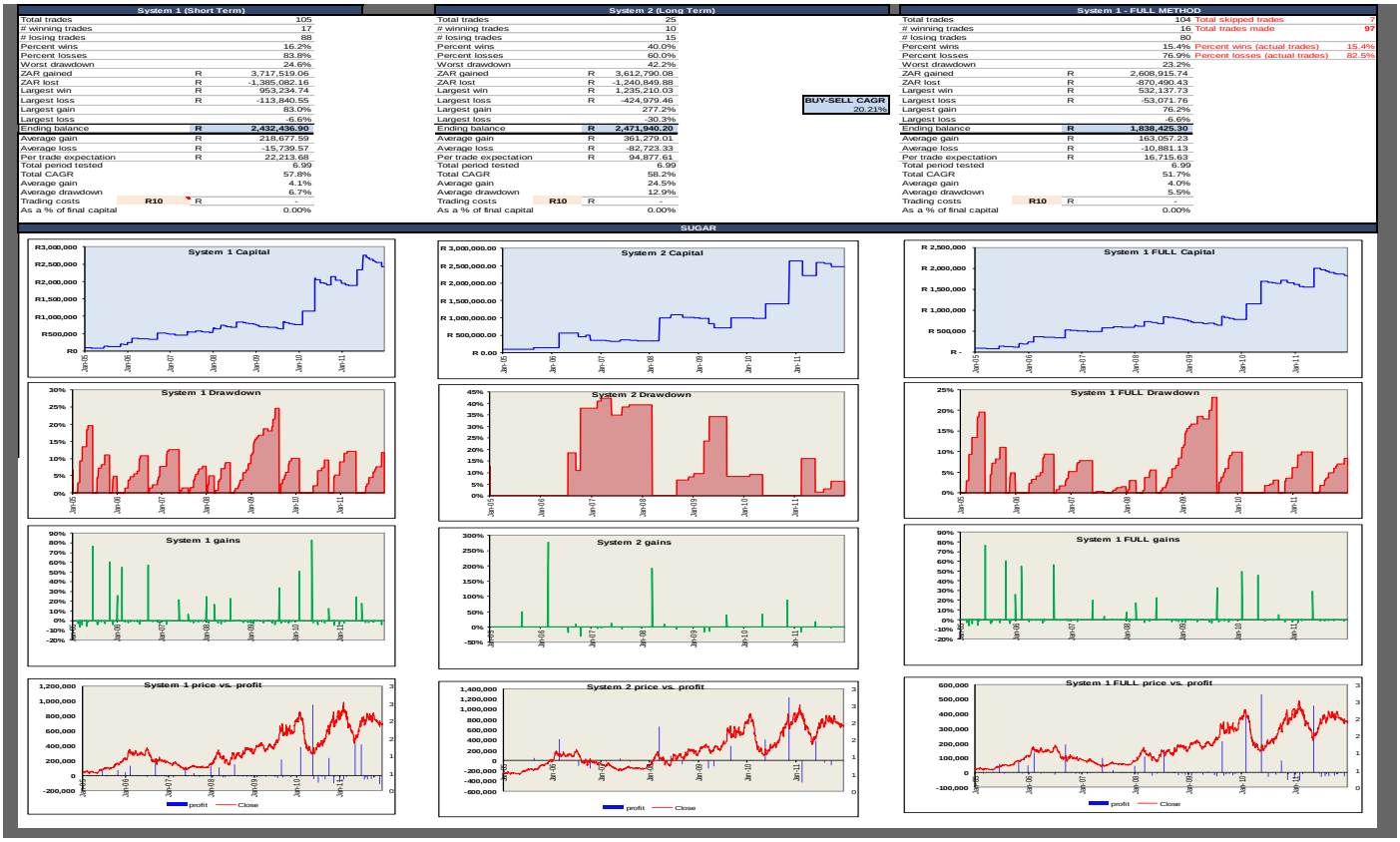
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)



Initial backtesting results (initial period)



System 1 (Short Term)		
Total trades		105
# winning trades		17
# losing trades		88
Percent wins		16.2%
Percent losses		83.8%
Worst drawdown		24.6%
ZAR gained	R	3,717,519.06
ZAR lost	R	-1,385,082.16
Largest win	R	953,234.74
Largest loss	R	-113,840.55
Largest gain		83.0%
Largest loss		-6.6%
Ending balance	R	2,432,436.90
Average gain	R	218,677.59
Average loss	R	-15,739.57
Per trade expectation	R	22,213.68
Total period tested		6.99
Total CAGR		57.8%
Average gain		4.1%
Average drawdown		6.7%
Trading costs	R10	R -
As a % of final capital		0.00%

System 2 (Long Term)		
Total trades		25
# winning trades		10
# losing trades		15
Percent wins		40.0%
Percent losses		60.0%
Worst drawdown		42.2%
ZAR gained	R	3,612,790.08
ZAR lost	R	-1,240,849.88
Largest win	R	1,235,210.03
Largest loss	R	-424,979.46
Largest gain		277.2%
Largest loss		-30.3%
Ending balance	R	2,471,940.20
Average gain	R	361,279.01
Average loss	R	-82,723.33
Per trade expectation	R	94,877.61
Total period tested		6.99
Total CAGR		58.2%
Average gain		24.5%
Average drawdown		12.9%
Trading costs	R10	R -
As a % of final capital		0.00%

BUY-SELL CAGR
20.21%

System 1 - FULL METHOD				
Total trades		104	Total skipped trades	7
# winning trades		16	Total trades made	97
# losing trades		80		
Percent wins		15.4%	Percent wins (actual trades)	15.4%
Percent losses		76.9%	Percent losses (actual trades)	82.5%
Worst drawdown		23.2%		
ZAR gained	R	2,608,915.74		
ZAR lost	R	-870,490.43		
Largest win	R	532,137.73		
Largest loss	R	-53,071.76		
Largest gain		76.2%		
Largest loss		-6.6%		
Ending balance	R	1,838,425.30		
Average gain	R	163,057.23		
Average loss	R	-10,881.13		
Per trade expectation	R	16,715.63		
Total period tested		6.99		
Total CAGR		51.7%		
Average gain		4.0%		
Average drawdown		5.5%		
Trading costs	R10	R -		
As a % of final capital		0.00%		

SUGAR

Out-of-sample results (2012-2014)

System 1 (Short Term)		
Total trades		53
# winning trades		17
# losing trades		36
Percent wins		32.1%
Percent losses		67.9%
Worst drawdown		97.0%
ZAR gained	R	15,190,396.99
ZAR lost	R	-2,314,667.76
Largest win	R	2,856,338.62
Largest loss	R	-294,427.09
Largest gain		23118.6%
Largest loss		-93.8%
Ending balance	R	12,975,729.23
Average gain	R	893,552.76
Average loss	R	-64,296.33
Per trade expectation	R	242,938.29
Total period tested		2.99
Total CAGR		407.8%
Average gain		442.8%
Average drawdown		7.5%
Trading costs	R10	R -
As a % of final capital		0.00%

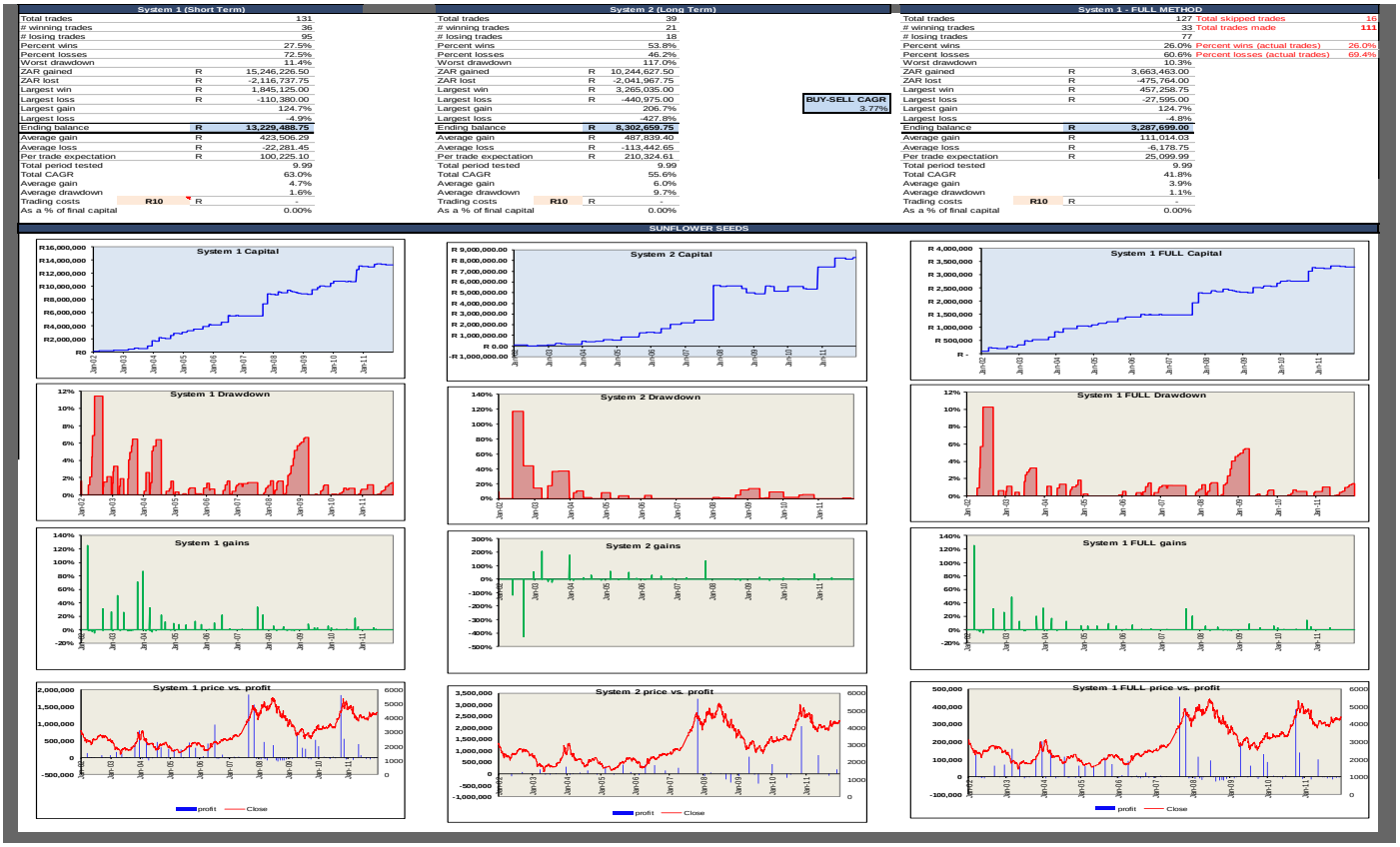
System 2 (Long Term)		
Total trades		41
# winning trades		13
# losing trades		28
Percent wins		31.7%
Percent losses		68.3%
Worst drawdown		44.3%
ZAR gained	R	3,570,030.45
ZAR lost	R	-834,915.71
Largest win	R	1,045,055.33
Largest loss	R	-138,592.12
Largest gain		602.3%
Largest loss		-20.8%
Ending balance	R	2,835,114.74
Average gain	R	274,617.73
Average loss	R	-29,818.42
Per trade expectation	R	66,710.12
Total period tested		2.99
Total CAGR		205.6%
Average gain		21.8%
Average drawdown		9.5%
Trading costs	R10	R -
As a % of final capital		0.00%

BUY-SELL CAGR
-5.20%

System 1 - FULL METHOD				
Total trades		53	Total skipped trades	10
# winning trades		14	Total trades made	43
# losing trades		29		
Percent wins		26.4%	Percent wins (actual trades)	26.4%
Percent losses		54.7%	Percent losses (actual trades)	67.4%
Worst drawdown		46.0%		
ZAR gained	R	10,911,813.35		
ZAR lost	R	-1,640,076.37		
Largest win	R	2,332,466.91		
Largest loss	R	-256,970.99		
Largest gain		1299.5%		
Largest loss		-46.0%		
Ending balance	R	9,371,736.99		
Average gain	R	779,415.24		
Average loss	R	-56,554.36		
Per trade expectation	R	174,938.43		
Total period tested		2.99		
Total CAGR		355.5%		
Average gain		38.1%		
Average drawdown		5.0%		
Trading costs	R10	R -		
As a % of final capital		0.00%		

SUGAR

Initial backtesting results (initial period)



System 1 (Short Term)		
Total trades		131
# winning trades		36
# losing trades		95
Percent wins		27.5%
Percent losses		72.5%
Worst drawdown		11.4%
ZAR gained	R	15,246,226.50
ZAR lost	R	-2,116,737.75
Largest win	R	1,845,125.00
Largest loss	R	-110,380.00
Largest gain		124.7%
Largest loss		-4.9%
Ending balance	R	13,229,488.75
Average gain	R	423,506.29
Average loss	R	-22,281.45
Per trade expectation	R	100,225.10
Total period tested		9.99
Total CAGR		63.0%
Average gain		4.7%
Average drawdown		1.6%
Trading costs	R10 R	-
As a % of final capital		0.00%

System 2 (Long Term)		
Total trades		39
# winning trades		21
# losing trades		18
Percent wins		53.8%
Percent losses		46.2%
Worst drawdown		117.0%
ZAR gained	R	10,244,627.50
ZAR lost	R	-2,041,967.75
Largest win	R	3,265,035.00
Largest loss	R	-440,975.00
Largest gain		206.7%
Largest loss		-427.8%
Ending balance	R	8,302,659.75
Average gain	R	487,839.40
Average loss	R	-113,442.65
Per trade expectation	R	210,324.61
Total period tested		9.99
Total CAGR		55.6%
Average gain		6.0%
Average drawdown		9.7%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR 3.77%

System 1 - FULL METHOD				
Total trades		127	Total skipped trades	16
# winning trades		33	Total trades made	111
# losing trades		77		
Percent wins		26.0%	Percent wins (actual trades)	26.0%
Percent losses		60.6%	Percent losses (actual trades)	69.4%
Worst drawdown		10.3%		
ZAR gained	R	3,663,463.00		
ZAR lost	R	-475,764.00		
Largest win	R	457,258.75		
Largest loss	R	-27,595.00		
Largest gain		124.7%		
Largest loss		-4.8%		
Ending balance	R	3,287,699.00		
Average gain	R	111,014.03		
Average loss	R	-6,178.75		
Per trade expectation	R	25,099.99		
Total period tested		9.99		
Total CAGR		41.8%		
Average gain		3.9%		
Average drawdown		1.1%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

SUNFLOWER SEEDS

System 1 Capital

System 2 Capital

System 1 FULL Capital

System 1 Drawdown

System 2 Drawdown

System 1 FULL Drawdown

System 1 gains

System 2 gains

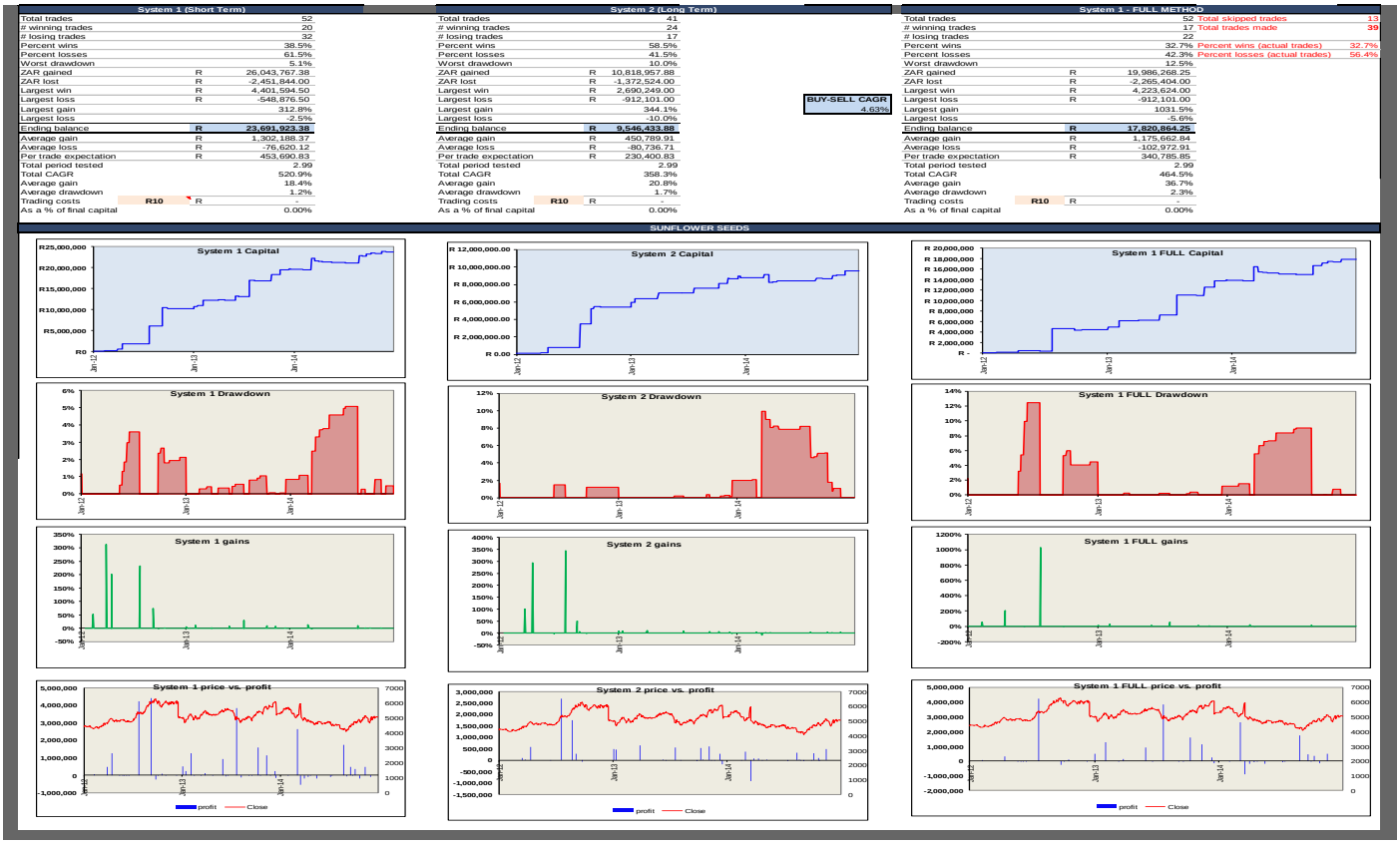
System 1 FULL gains

System 1 price vs. profit

System 2 price vs. profit

System 1 FULL price vs. profit

Out-of-sample results (2012-2014)



System 1 (Short Term)		
Total trades		52
# winning trades		20
# losing trades		32
Percent wins		38.5%
Percent losses		61.5%
Worst drawdown		5.1%
ZAR gained	R	26,043,767.38
ZAR lost	R	-2,451,844.00
Largest win	R	4,401,594.50
Largest loss	R	-548,876.50
Largest gain		312.8%
Largest loss		-2.5%
Ending balance	R	23,691,923.38
Average gain	R	1,302,188.37
Average loss	R	-76,620.12
Per trade expectation	R	453,690.83
Total period tested		2.99
Total CAGR		520.9%
Average gain		18.4%
Average drawdown		1.2%
Trading costs	R10 R	-
As a % of final capital		0.00%

System 2 (Long Term)		
Total trades		41
# winning trades		24
# losing trades		17
Percent wins		58.5%
Percent losses		41.5%
Worst drawdown		10.0%
ZAR gained	R	10,818,957.88
ZAR lost	R	-1,372,524.00
Largest win	R	2,690,249.00
Largest loss	R	-912,101.00
Largest gain		344.1%
Largest loss		-10.0%
Ending balance	R	9,546,433.88
Average gain	R	450,789.91
Average loss	R	-80,736.71
Per trade expectation	R	230,400.83
Total period tested		2.99
Total CAGR		358.3%
Average gain		20.8%
Average drawdown		1.7%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR 4.63%

System 1 - FULL METHOD				
Total trades		52	Total skipped trades	13
# winning trades		17	Total trades made	39
# losing trades		22		
Percent wins		32.7%	Percent wins (actual trades)	32.7%
Percent losses		42.3%	Percent losses (actual trades)	56.4%
Worst drawdown		12.5%		
ZAR gained	R	19,986,268.25		
ZAR lost	R	-2,265,404.00		
Largest win	R	4,223,624.00		
Largest loss	R	-912,101.00		
Largest gain		1031.5%		
Largest loss		-5.6%		
Ending balance	R	17,820,864.25		
Average gain	R	1,175,662.84		
Average loss	R	-102,972.91		
Per trade expectation	R	340,785.85		
Total period tested		2.99		
Total CAGR		464.5%		
Average gain		36.7%		
Average drawdown		2.3%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

SUNFLOWER SEEDS

System 1 Capital

System 2 Capital

System 1 FULL Capital

System 1 Drawdown

System 2 Drawdown

System 1 FULL Drawdown

System 1 gains

System 2 gains

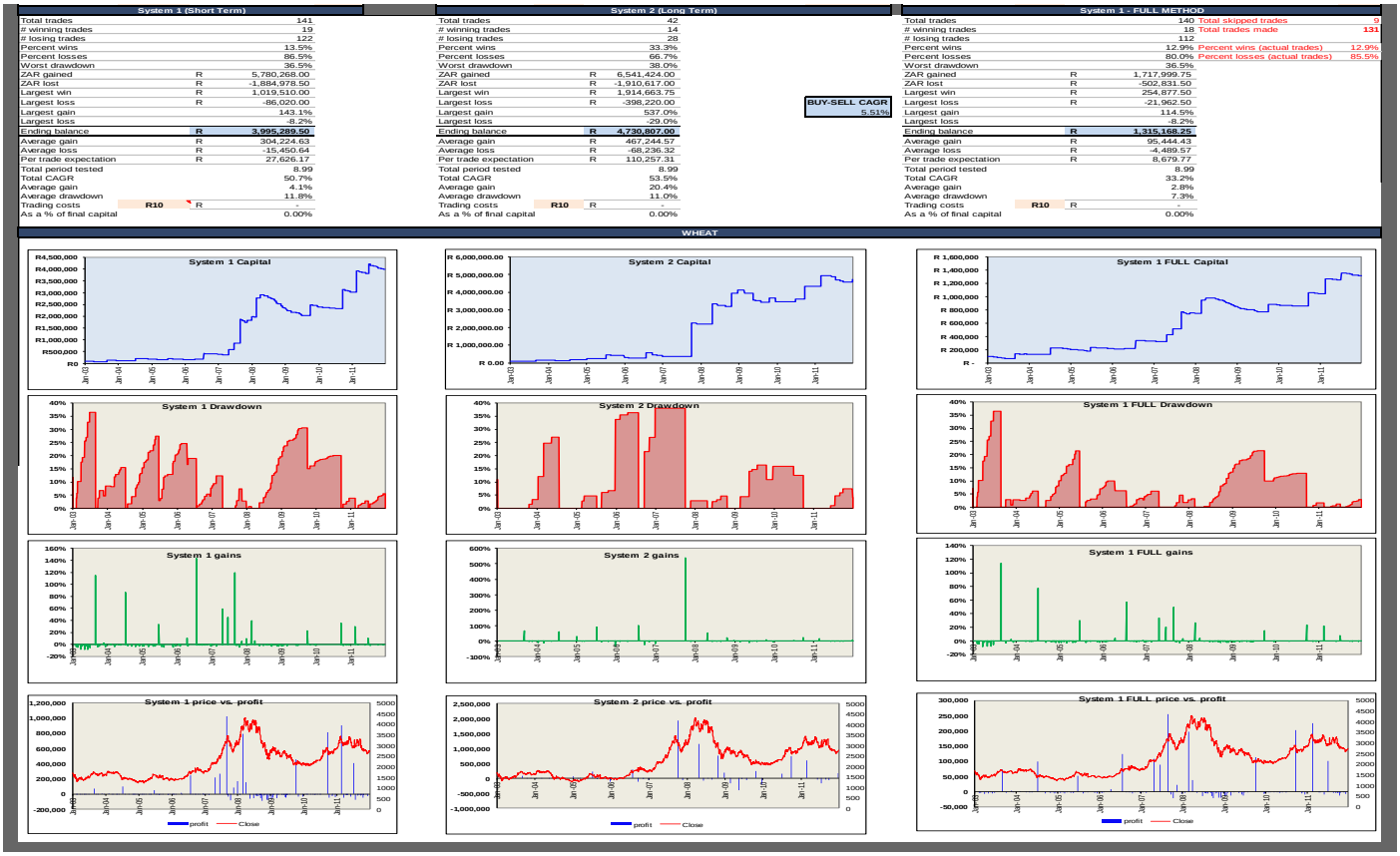
System 1 FULL gains

System 1 price vs. profit

System 2 price vs. profit

System 1 FULL price vs. profit

Initial backtesting results (initial period)



System 1 (Short Term)		
Total trades		141
# winning trades		19
# losing trades		122
Percent wins		13.5%
Percent losses		86.5%
Worst drawdown		36.5%
ZAR gained	R	5,780,268.00
ZAR lost	R	-1,884,978.50
Largest win	R	1,019,510.00
Largest loss	R	-86,020.00
Largest gain		143.1%
Largest loss		-8.2%
Ending balance	R	3,995,289.50
Average gain	R	304,224.63
Average loss	R	-15,450.64
Per trade expectation	R	27,626.17
Total period tested		8.99
Total CAGR		50.7%
Average gain		4.1%
Average drawdown		11.8%
Trading costs	R10 R	-
As a % of final capital		0.00%

System 2 (Long Term)		
Total trades		42
# winning trades		14
# losing trades		28
Percent wins		33.3%
Percent losses		66.7%
Worst drawdown		38.0%
ZAR gained	R	6,541,424.00
ZAR lost	R	-1,910,617.00
Largest win	R	1,914,663.75
Largest loss	R	-398,220.00
Largest gain		537.0%
Largest loss		-29.0%
Ending balance	R	4,730,807.00
Average gain	R	467,244.57
Average loss	R	-68,236.32
Per trade expectation	R	110,257.31
Total period tested		8.99
Total CAGR		53.5%
Average gain		20.4%
Average drawdown		11.0%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR 5.51%

System 1 - FULL METHOD				
Total trades		140	Total skipped trades	9
# winning trades		18	Total trades made	131
# losing trades		112		
Percent wins		12.9%	Percent wins (actual trades)	12.9%
Percent losses		80.0%	Percent losses (actual trades)	85.5%
Worst drawdown		36.5%		
ZAR gained	R	1,717,999.75		
ZAR lost	R	-502,831.50		
Largest win	R	254,877.50		
Largest loss	R	-21,962.50		
Largest gain		114.5%		
Largest loss		-8.2%		
Ending balance	R	1,315,168.25		
Average gain	R	95,444.43		
Average loss	R	-4,489.57		
Per trade expectation	R	8,679.77		
Total period tested		8.99		
Total CAGR		33.2%		
Average gain		2.8%		
Average drawdown		7.3%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

WHEAT

System 1 Capital | System 2 Capital | System 1 FULL Capital

System 1 Drawdown | System 2 Drawdown | System 1 FULL Drawdown

System 1 gains | System 2 gains | System 1 FULL gains

System 1 price vs. profit | System 2 price vs. profit | System 1 FULL price vs. profit

Out-of-sample results (2012-2014)

System 1 (Short Term)		
Total trades		48
# winning trades		17
# losing trades		31
Percent wins		35.4%
Percent losses		64.6%
Worst drawdown		84.7%
ZAR gained	R	9,945,127.07
ZAR lost	R	-1,131,444.75
Largest win	R	4,052,906.23
Largest loss	R	-226,920.90
Largest gain		1737.0%
Largest loss		-57.0%
Ending balance	R	8,913,682.32
Average gain	R	585,007.47
Average loss	R	-36,498.22
Per trade expectation	R	183,618.38
Total period tested		2.99
Total CAGR		347.9%
Average gain		64.9%
Average drawdown		6.9%
Trading costs	R10 R	-
As a % of final capital		0.00%

System 2 (Long Term)		
Total trades		46
# winning trades		23
# losing trades		23
Percent wins		50.0%
Percent losses		50.0%
Worst drawdown		6.4%
ZAR gained	R	6,677,661.68
ZAR lost	R	-214,602.20
Largest win	R	2,990,023.90
Largest loss	R	-20,640.00
Largest gain		1000.5%
Largest loss		-6.4%
Ending balance	R	6,563,059.48
Average gain	R	290,333.12
Average loss	R	-9,330.53
Per trade expectation	R	140,501.29
Total period tested		2.99
Total CAGR		304.4%
Average gain		27.7%
Average drawdown		0.7%
Trading costs	R10 R	-
As a % of final capital		0.00%

BUY-SELL CAGR 12.60%

System 1 - FULL METHOD				
Total trades		48	Total skipped trades	11
# winning trades		13	Total trades made	37
# losing trades		24		
Percent wins		27.1%	Percent wins (actual trades)	27.1%
Percent losses		50.0%	Percent losses (actual trades)	64.9%
Worst drawdown		84.7%		
ZAR gained	R	3,948,444.00		
ZAR lost	R	-664,958.15		
Largest win	R	1,235,978.00		
Largest loss	R	-225,271.00		
Largest gain		1737.0%		
Largest loss		-57.0%		
Ending balance	R	3,383,485.85		
Average gain	R	303,726.46		
Average loss	R	-27,706.59		
Per trade expectation	R	68,405.96		
Total period tested		2.99		
Total CAGR		275.2%		
Average gain		53.9%		
Average drawdown		9.1%		
Trading costs	R10 R	-		
As a % of final capital		0.00%		

WHEAT

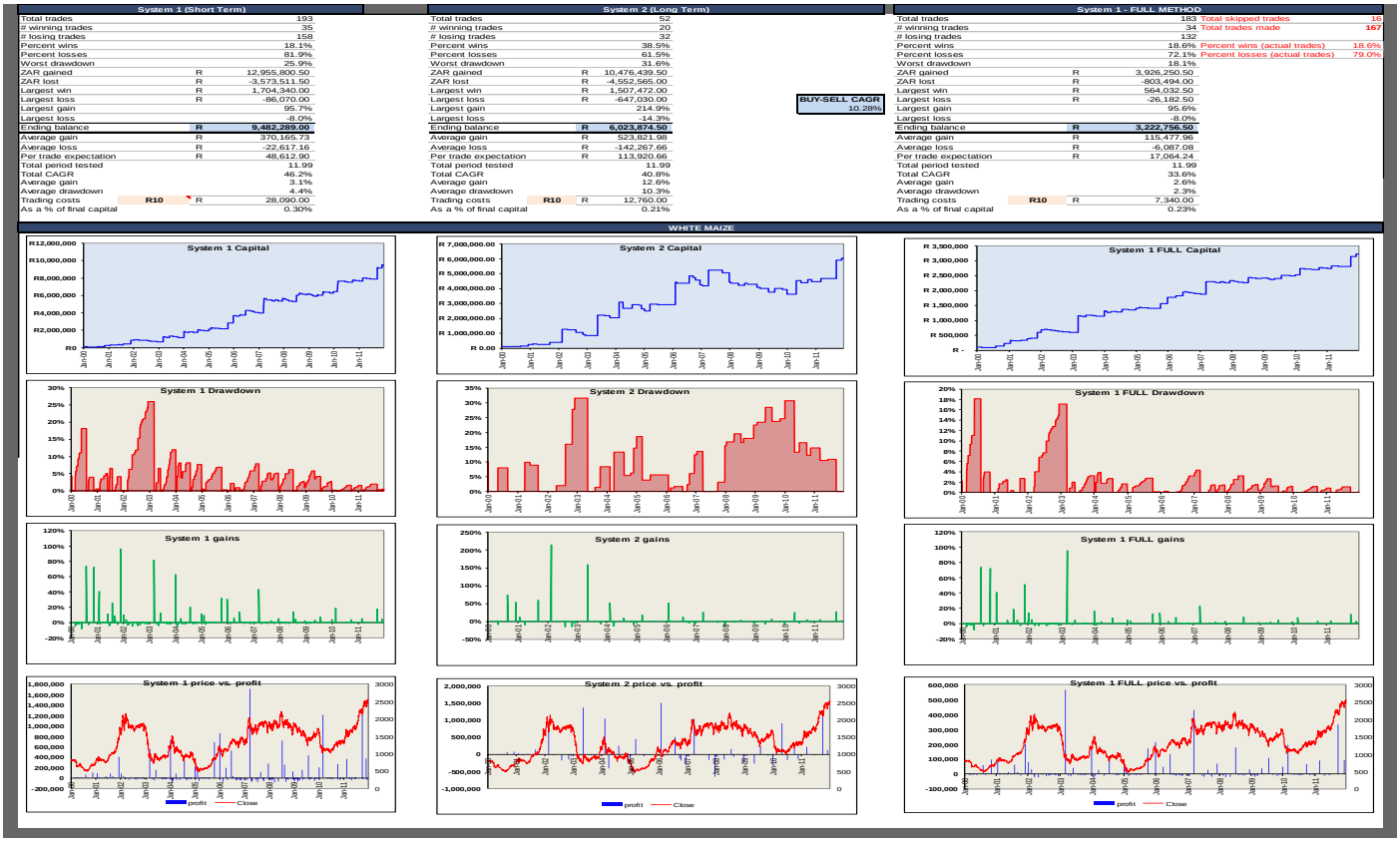
System 1 Capital | System 2 Capital | System 1 FULL Capital

System 1 Drawdown | System 2 Drawdown | System 1 FULL Drawdown

System 1 gains | System 2 gains | System 1 FULL gains

System 1 price vs. profit | System 2 price vs. profit | System 1 FULL price vs. profit

Initial backtesting results (initial period)



System 1 (Short Term)		
Total trades		193
# winning trades		35
# losing trades		158
Percent wins		18.1%
Percent losses		81.9%
Worst drawdown		25.9%
ZAR gained	R	12,955,800.50
ZAR lost	R	-3,573,511.50
Largest win	R	1,704,340.00
Largest loss	R	-86,070.00
Largest gain		95.7%
Largest loss		-8.0%
Ending balance	R	9,482,289.00
Average gain	R	370,165.73
Average loss	R	-22,617.16
Per trade expectation	R	48,612.90
Total period tested		11.99
Total CAGR		46.2%
Average gain		3.1%
Average drawdown		4.4%
Trading costs	R10 R	28,090.00
As a % of final capital		0.30%

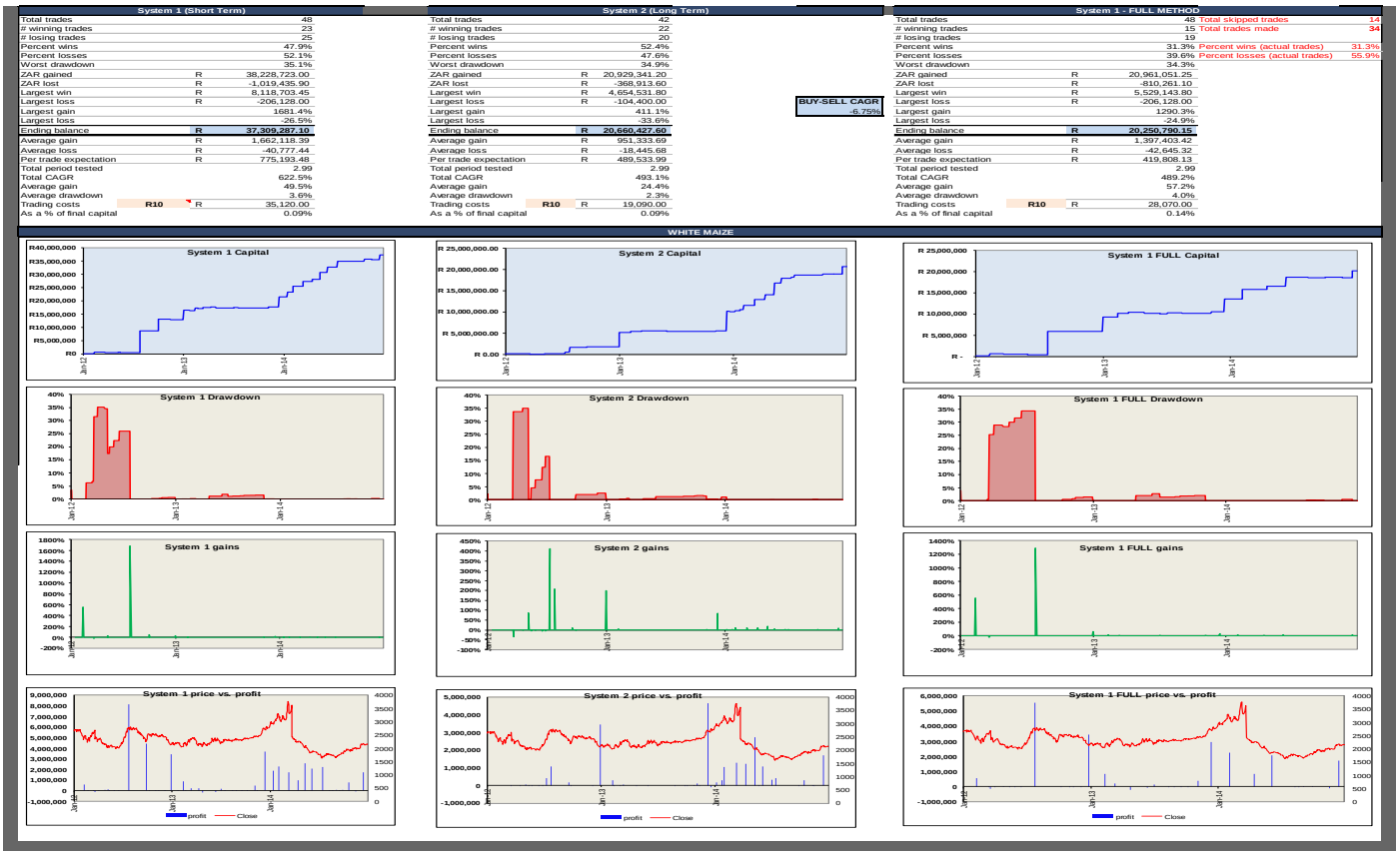
System 2 (Long Term)		
Total trades		52
# winning trades		20
# losing trades		32
Percent wins		38.5%
Percent losses		61.5%
Worst drawdown		31.6%
ZAR gained	R	10,476,439.50
ZAR lost	R	-4,552,565.00
Largest win	R	1,507,472.00
Largest loss	R	-647,030.00
Largest gain		214.9%
Largest loss		-14.3%
Ending balance	R	6,023,874.50
Average gain	R	523,821.98
Average loss	R	-142,267.66
Per trade expectation	R	113,920.66
Total period tested		11.99
Total CAGR		40.8%
Average gain		12.6%
Average drawdown		10.3%
Trading costs	R10 R	12,760.00
As a % of final capital		0.21%

BUY-SELL CAGR 10.28%

System 1 - FULL METHOD				
Total trades		183	Total skipped trades	16
# winning trades		34	Total trades made	167
# losing trades		132		
Percent wins		18.6%	Percent wins (actual trades)	18.6%
Percent losses		72.1%	Percent losses (actual trades)	79.0%
Worst drawdown		18.1%		
ZAR gained	R	3,926,250.50		
ZAR lost	R	-803,494.00		
Largest win	R	564,032.50		
Largest loss	R	-26,182.50		
Largest gain		95.6%		
Largest loss		-8.0%		
Ending balance	R	3,222,756.50		
Average gain	R	115,477.96		
Average loss	R	-6,087.08		
Per trade expectation	R	17,064.24		
Total period tested		11.99		
Total CAGR		33.6%		
Average gain		2.6%		
Average drawdown		2.3%		
Trading costs	R10 R	7,340.00		
As a % of final capital		0.23%		

WHITE MAIZE

Out-of-sample results (2012-2014)



System 1 (Short Term)		
Total trades		48
# winning trades		23
# losing trades		25
Percent wins		47.9%
Percent losses		52.1%
Worst drawdown		35.1%
ZAR gained	R	38,228,723.00
ZAR lost	R	-1,019,435.90
Largest win	R	8,118,703.45
Largest loss	R	-206,128.00
Largest gain		1681.4%
Largest loss		-26.5%
Ending balance	R	37,309,287.10
Average gain	R	1,662,118.39
Average loss	R	-40,777.44
Per trade expectation	R	775,193.48
Total period tested		2.99
Total CAGR		622.5%
Average gain		49.5%
Average drawdown		3.6%
Trading costs	R10 R	35,120.00
As a % of final capital		0.09%

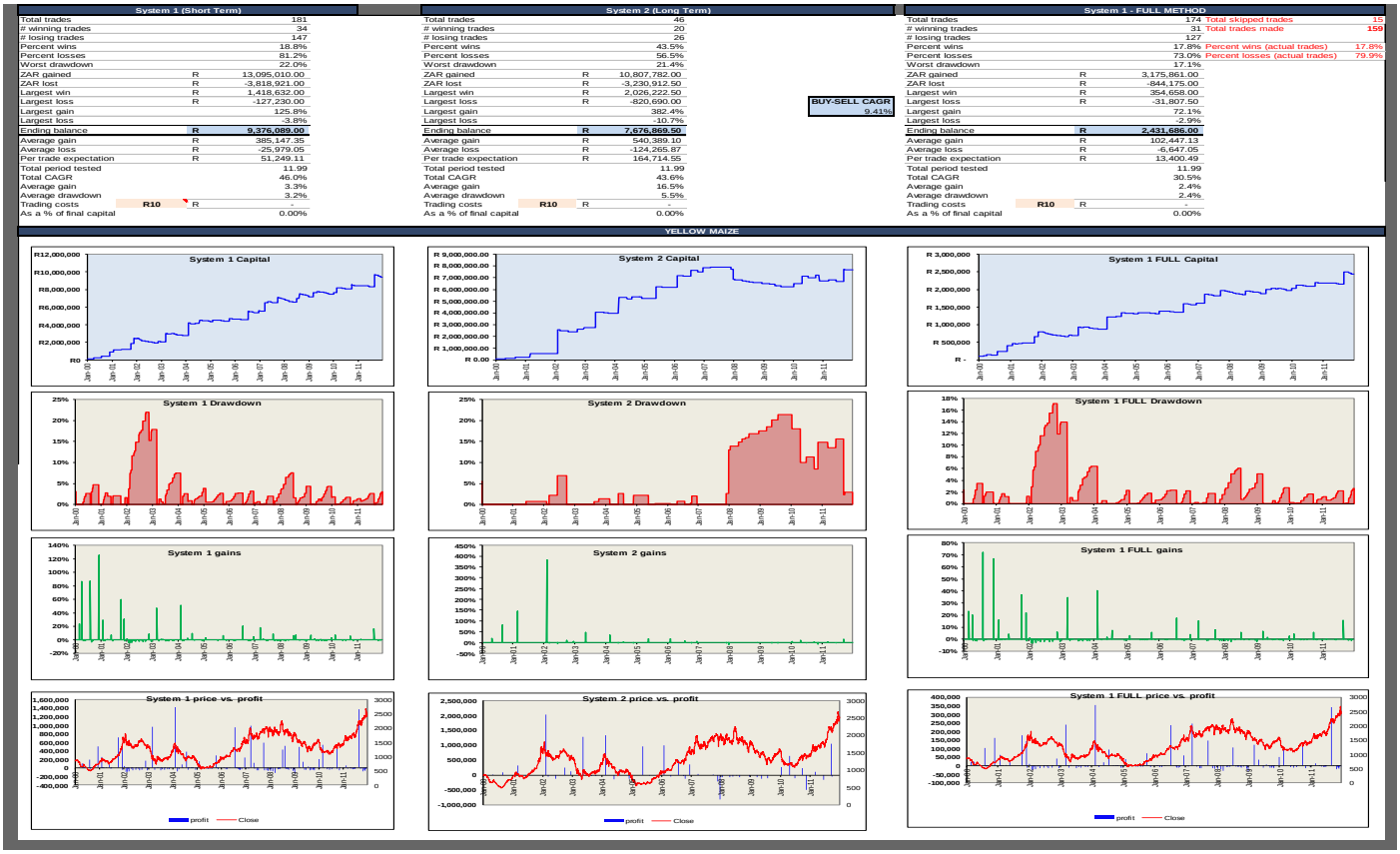
System 2 (Long Term)		
Total trades		42
# winning trades		22
# losing trades		20
Percent wins		52.4%
Percent losses		47.6%
Worst drawdown		34.9%
ZAR gained	R	20,929,341.20
ZAR lost	R	-368,913.60
Largest win	R	4,654,531.80
Largest loss	R	-104,400.00
Largest gain		411.1%
Largest loss		-33.6%
Ending balance	R	20,660,427.60
Average gain	R	951,333.69
Average loss	R	-18,445.68
Per trade expectation	R	489,533.99
Total period tested		2.99
Total CAGR		493.1%
Average gain		24.4%
Average drawdown		2.3%
Trading costs	R10 R	19,090.00
As a % of final capital		0.09%

BUY-SELL CAGR -6.75%

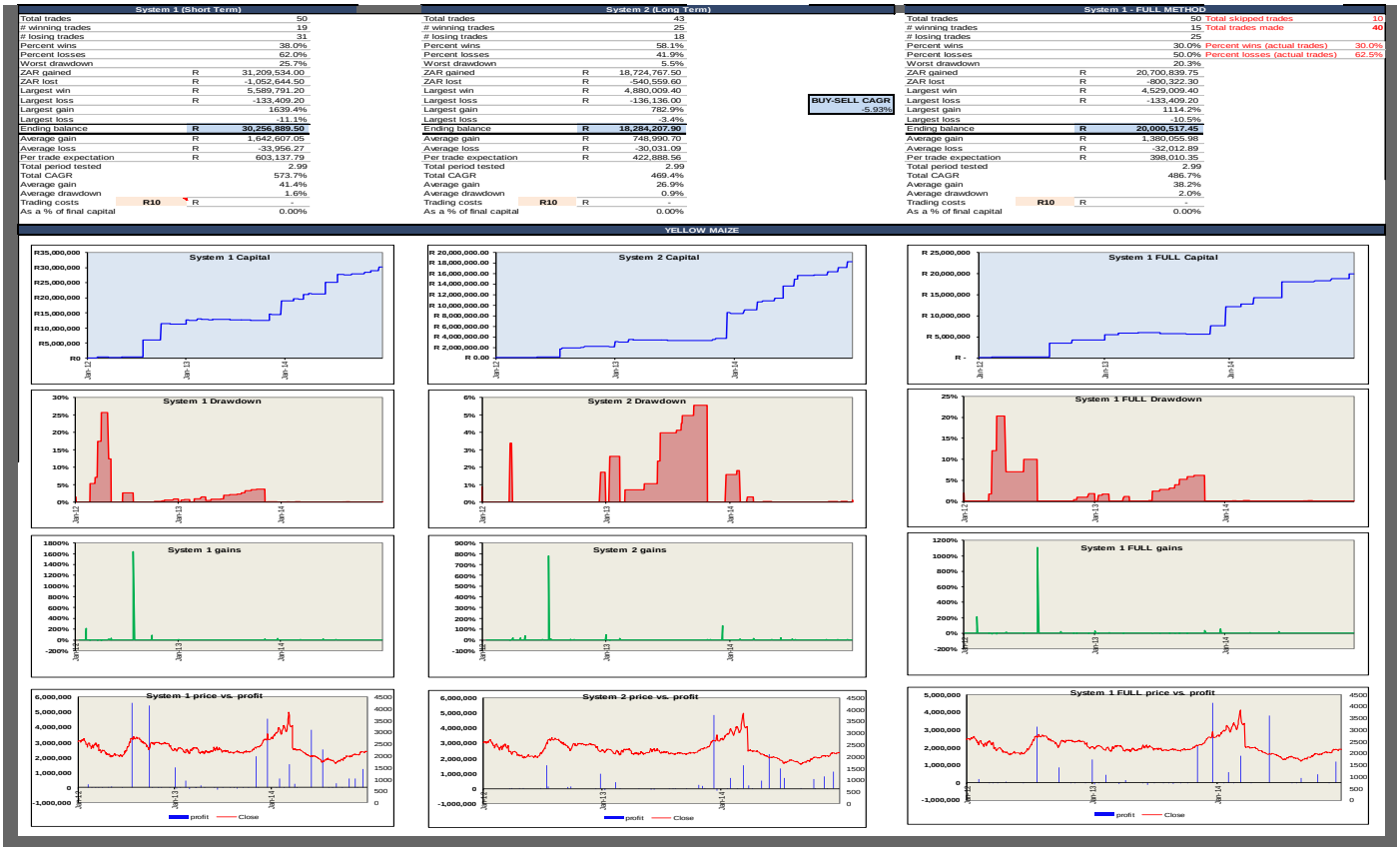
System 1 - FULL METHOD				
Total trades		48	Total skipped trades	14
# winning trades		15	Total trades made	34
# losing trades		19		
Percent wins		31.3%	Percent wins (actual trades)	31.3%
Percent losses		39.6%	Percent losses (actual trades)	55.9%
Worst drawdown		34.3%		
ZAR gained	R	20,961,051.25		
ZAR lost	R	-810,261.10		
Largest win	R	5,529,143.80		
Largest loss	R	-206,128.00		
Largest gain		1290.3%		
Largest loss		-24.9%		
Ending balance	R	20,250,790.15		
Average gain	R	1,397,403.42		
Average loss	R	-42,645.32		
Per trade expectation	R	419,808.13		
Total period tested		2.99		
Total CAGR		489.2%		
Average gain		57.2%		
Average drawdown		4.0%		
Trading costs	R10 R	28,070.00		
As a % of final capital		0.14%		

WHITE MAIZE

Out-of-sample results (2012-2014)

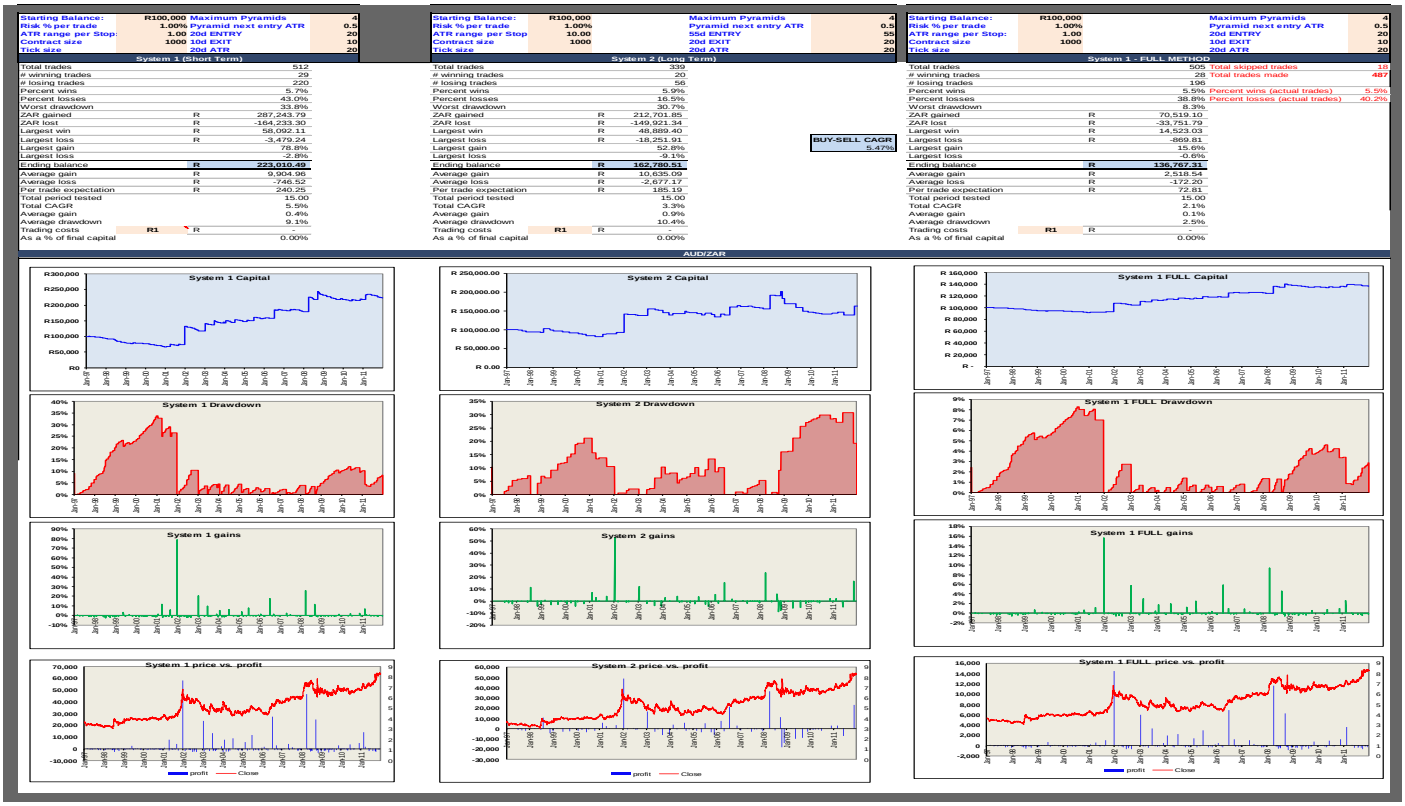


Initial backtesting results (initial period)



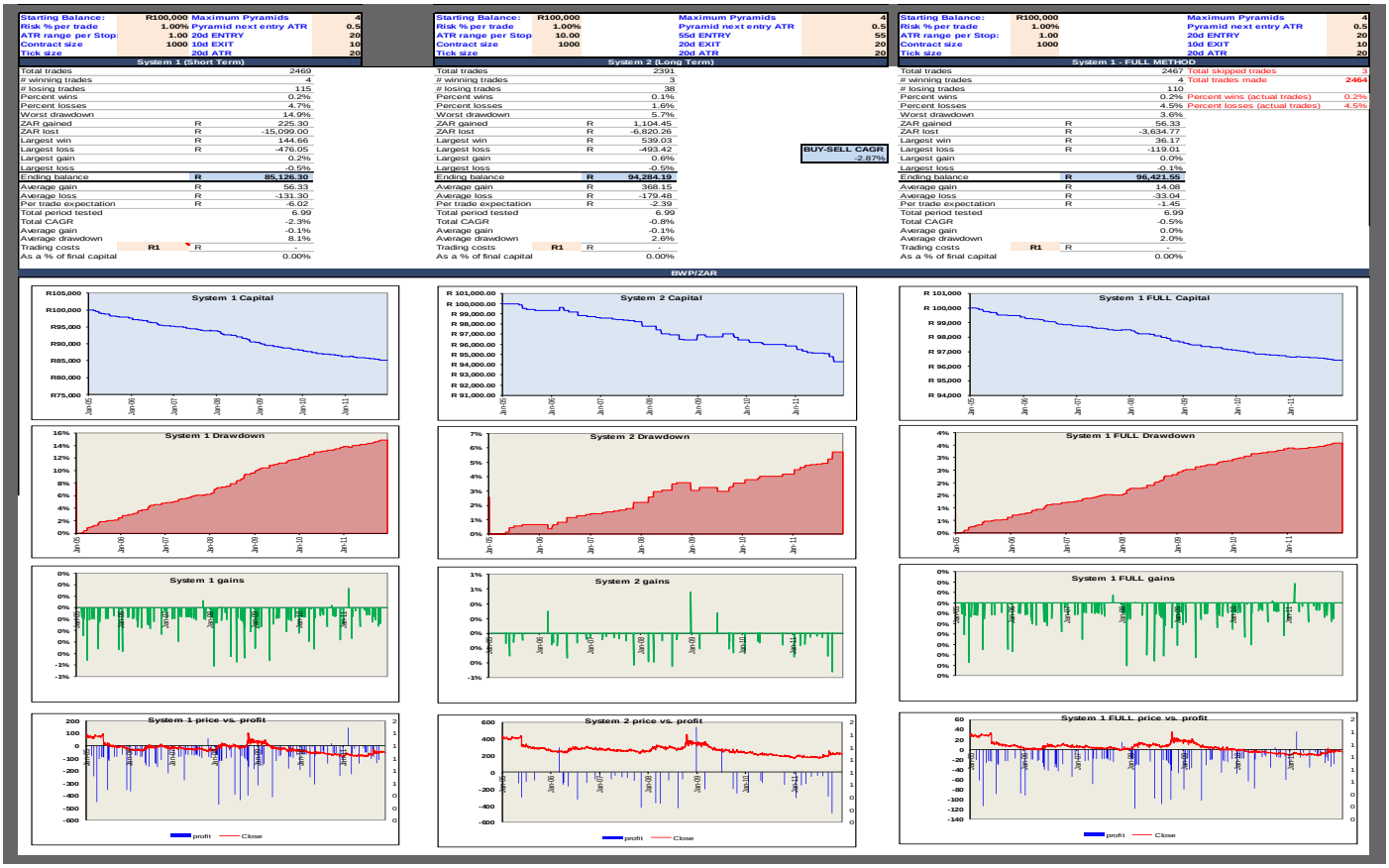
Currencies

Initial backtesting results (initial period)



Out-of-sample results (2012-2014)

Initial backtesting results (initial period)



Starting Balance:	R100,000	Maximum Pyramids	4
Risk % per trade	1.00%	Pyramid next entry ATR	0.5
ATR range per Stop:	1.00	20d ENTRY	20
Contract size	1000	10d EXIT	10
Tick size		20d ATR	20

System 1 (Short Term)

Total trades		2469
# winning trades		4
# losing trades		115
Percent wins		0.2%
Percent losses		4.7%
Worst drawdown		14.9%
ZAR gained	R	225.30
ZAR lost	R	-15,099.00
Largest win	R	144.66
Largest loss	R	-476.05
Largest gain		0.2%
Largest loss		-0.5%
Ending balance	R	85,126.30
Average gain	R	56.33
Average loss	R	-131.30
Per trade expectation	R	-6.02
Total period tested		6.99
Total CAGR		-2.3%
Average gain		-0.1%
Average drawdown		8.1%
Trading costs	R1 R	-
As a % of final capital		0.00%

Starting Balance:	R100,000	Maximum Pyramids	4
Risk % per trade	1.00%	Pyramid next entry ATR	0.5
ATR range per Stop	10.00	55d ENTRY	55
Contract size	1000	20d EXIT	20
Tick size		20d ATR	20

System 2 (Long Term)

Total trades		2391
# winning trades		3
# losing trades		38
Percent wins		0.1%
Percent losses		1.6%
Worst drawdown		5.7%
ZAR gained	R	1,104.45
ZAR lost	R	-6,820.26
Largest win	R	539.03
Largest loss	R	-493.42
Largest gain		0.6%
Largest loss		-0.5%
Ending balance	R	94,284.19
Average gain	R	368.15
Average loss	R	-179.48
Per trade expectation	R	-2.39
Total period tested		6.99
Total CAGR		-0.8%
Average gain		-0.1%
Average drawdown		2.6%
Trading costs	R1 R	-
As a % of final capital		0.00%

BUY-SELL CAGR
-2.87%

Starting Balance:	R100,000	Maximum Pyramids	4
Risk % per trade	1.00%	Pyramid next entry ATR	0.5
ATR range per Stop:	1.00	20d ENTRY	20
Contract size	1000	10d EXIT	10
Tick size		20d ATR	20

System 1 - FULL METHOD

Total trades		2467	Total skipped trades 3
# winning trades		4	Total trades made 2464
# losing trades		110	
Percent wins		0.2%	Percent wins (actual trades) 0.2%
Percent losses		4.5%	Percent losses (actual trades) 4.5%
Worst drawdown		3.6%	
ZAR gained	R	56.33	
ZAR lost	R	-3,634.77	
Largest win	R	36.17	
Largest loss	R	-119.01	
Largest gain		0.0%	
Largest loss		-0.1%	
Ending balance	R	96,421.55	
Average gain	R	14.08	
Average loss	R	-33.04	
Per trade expectation	R	-1.45	
Total period tested		6.99	
Total CAGR		-0.5%	
Average gain		0.0%	
Average drawdown		2.0%	
Trading costs	R1 R	-	
As a % of final capital		0.00%	

BWP/ZAR

Out-of-sample results (2012-2014)

Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	3.00%	Pyramid next entry ATR	0.05
ATR range per Stop:	10.00	20d ENTRY	20
Contract size	1000	3d EXIT	3
Tick size		20d ATR	20

System 1 (Short Term)

Total trades		2420
# winning trades		27
# losing trades		43
Percent wins		1.1%
Percent losses		1.8%
Worst drawdown		0.5%
ZAR gained	R	7,897.53
ZAR lost	R	-1,394.32
Largest win	R	3,611.40
Largest loss	R	-121.62
Largest gain		3.6%
Largest loss		-0.1%
Ending balance	R	106,503.20
Average gain	R	292.50
Average loss	R	-32.43
Per trade expectation	R	2.69
Total period tested		3.00
Total CAGR		2.1%
Average gain		0.1%
Average drawdown		0.1%
Trading costs	R1 R	-
As a % of final capital		0.00%

Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	3.00%	Pyramid next entry ATR	0.05
ATR range per Stop	10.00	60d ENTRY	60
Contract size	1000	5d EXIT	5
Tick size		20d ATR	20

System 2 (Long Term)

Total trades		2377
# winning trades		7
# losing trades		20
Percent wins		0.3%
Percent losses		0.8%
Worst drawdown		0.5%
ZAR gained	R	6,427.82
ZAR lost	R	-1,255.36
Largest win	R	5,038.11
Largest loss	R	-180.18
Largest gain		5.0%
Largest loss		-0.2%
Ending balance	R	105,172.46
Average gain	R	918.26
Average loss	R	-62.77
Per trade expectation	R	2.18
Total period tested		3.00
Total CAGR		1.7%
Average gain		0.2%
Average drawdown		0.1%
Trading costs	R1 R	-
As a % of final capital		0.00%

BUY-SELL CAGR
4.00%

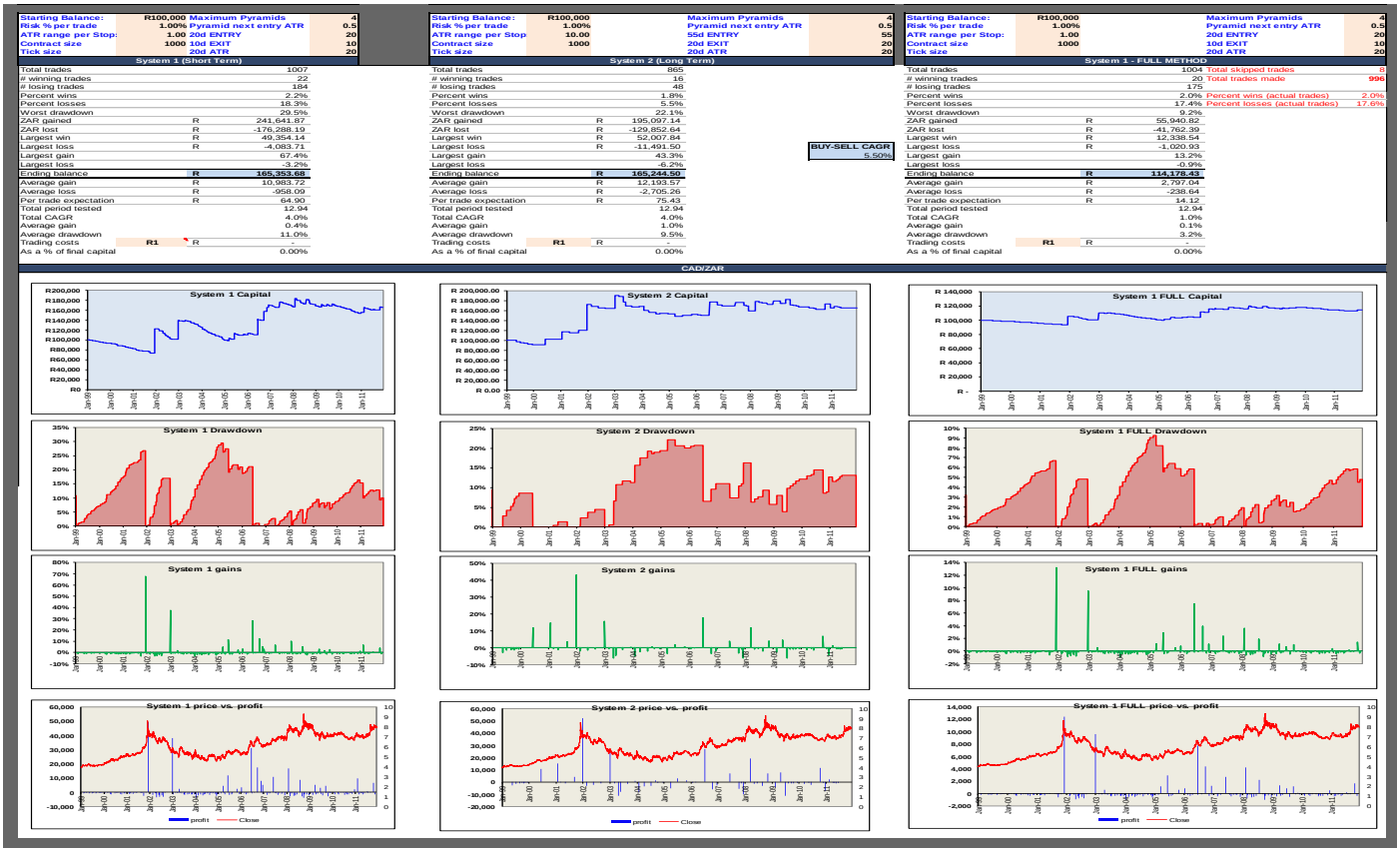
Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	3.00%	Pyramid next entry ATR	0.05
ATR range per Stop:	10.00	20d ENTRY	20
Contract size	1000	3d EXIT	3
Tick size		20d ATR	20

System 1 - FULL METHOD

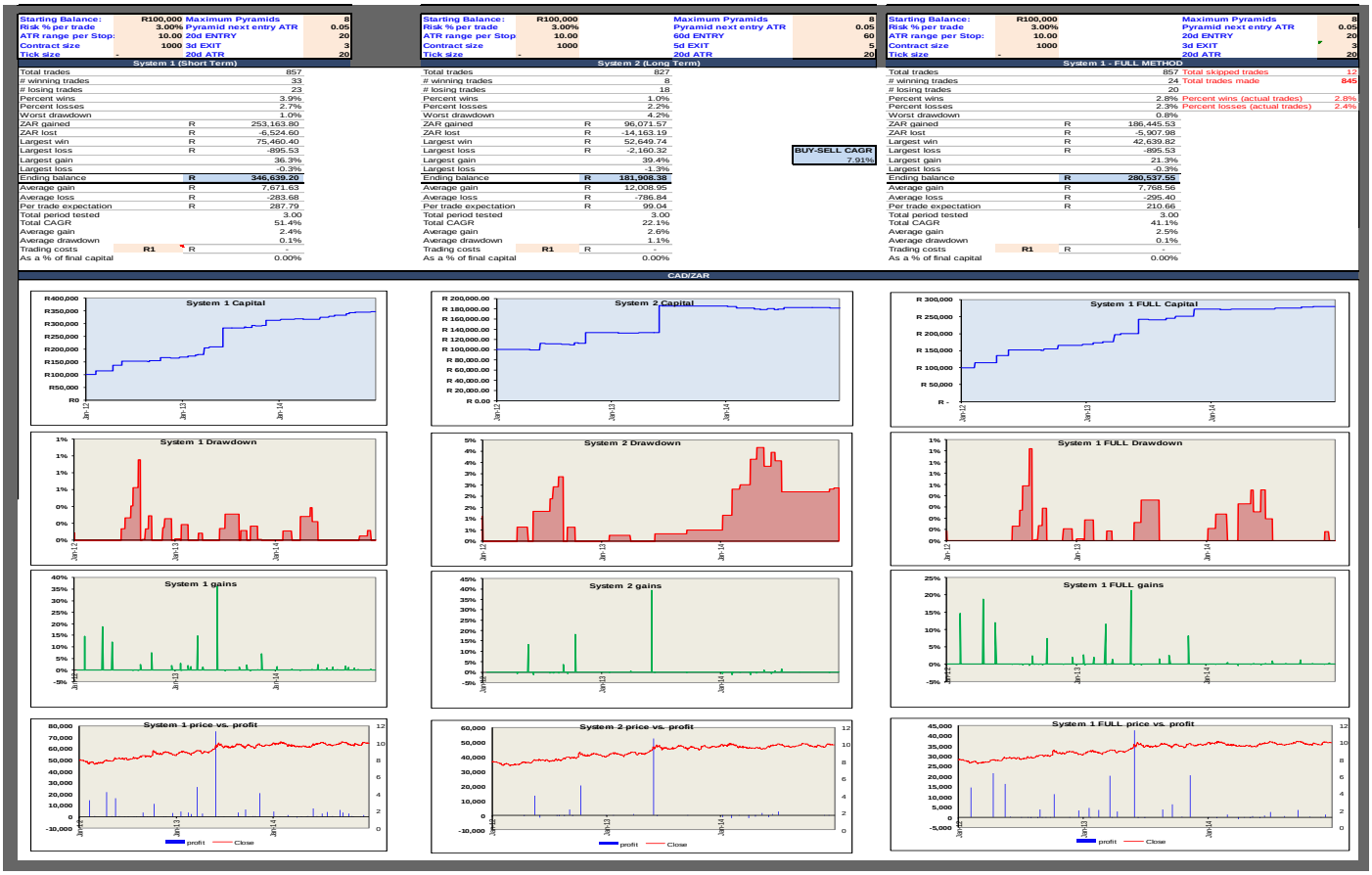
Total trades		2421	Total skipped trades 11
# winning trades		23	Total trades made 2410
# losing trades		37	
Percent wins		1.0%	Percent wins (actual trades) 1.0%
Percent losses		1.5%	Percent losses (actual trades) 1.5%
Worst drawdown		0.4%	
ZAR gained	R	6,992.23	
ZAR lost	R	-1,218.32	
Largest win	R	2,948.58	
Largest loss	R	-121.62	
Largest gain		2.9%	
Largest loss		-0.1%	
Ending balance	R	105,773.91	
Average gain	R	304.01	
Average loss	R	-32.93	
Per trade expectation	R	2.38	
Total period tested		3.00	
Total CAGR		1.9%	
Average gain		0.1%	
Average drawdown		0.1%	
Trading costs	R1 R	-	
As a % of final capital		0.00%	

BWP/ZAR

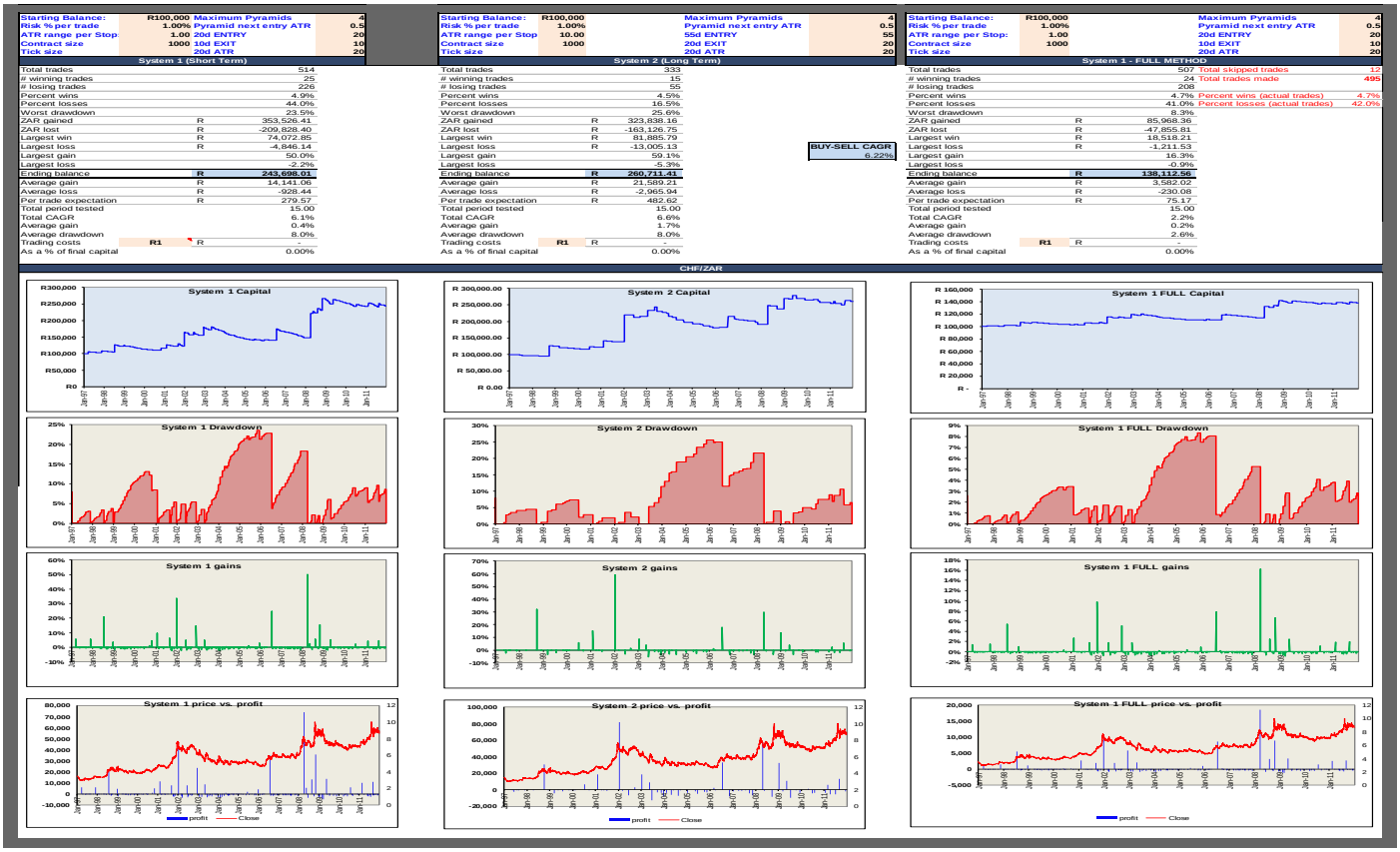
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)

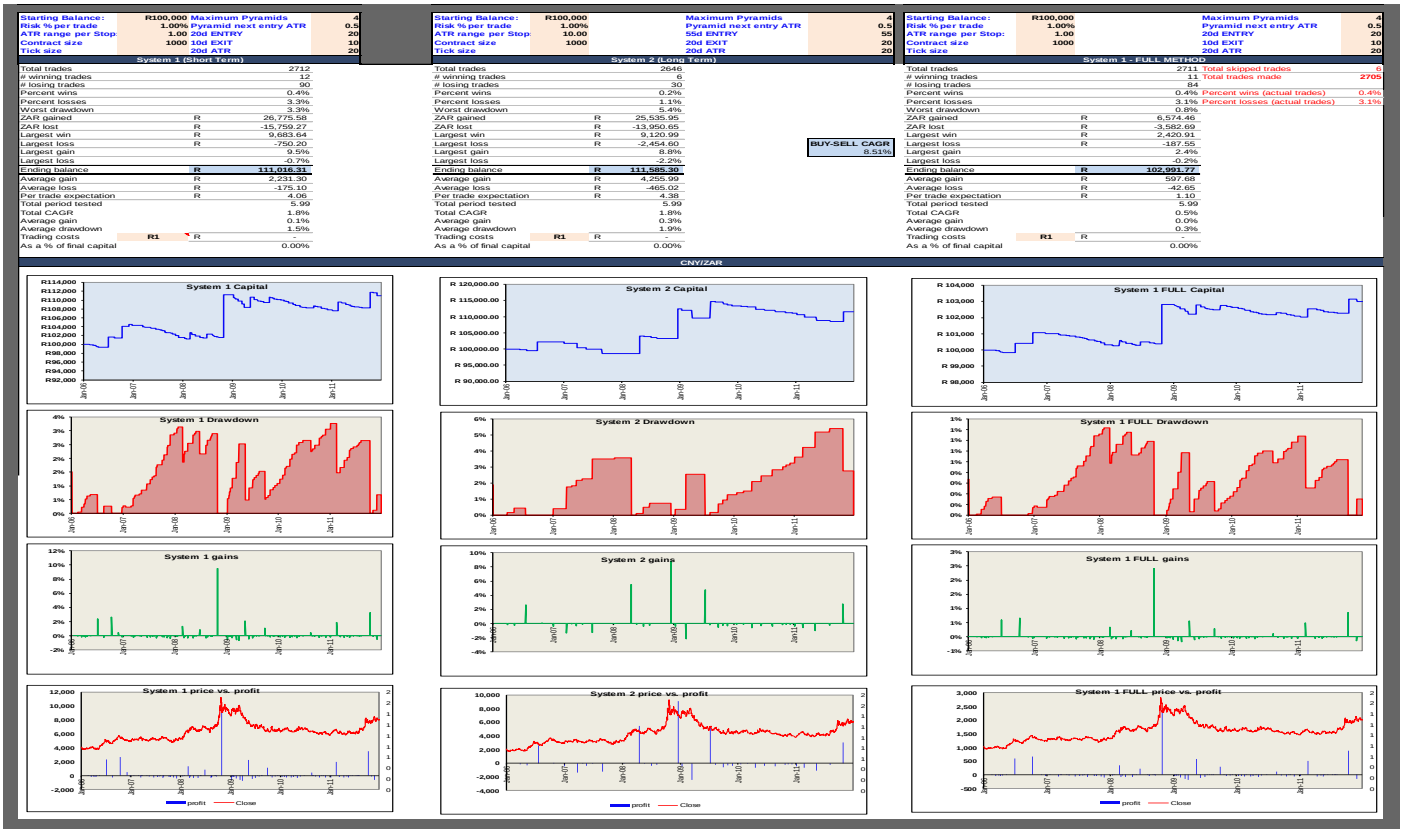


Initial backtesting results (initial period)



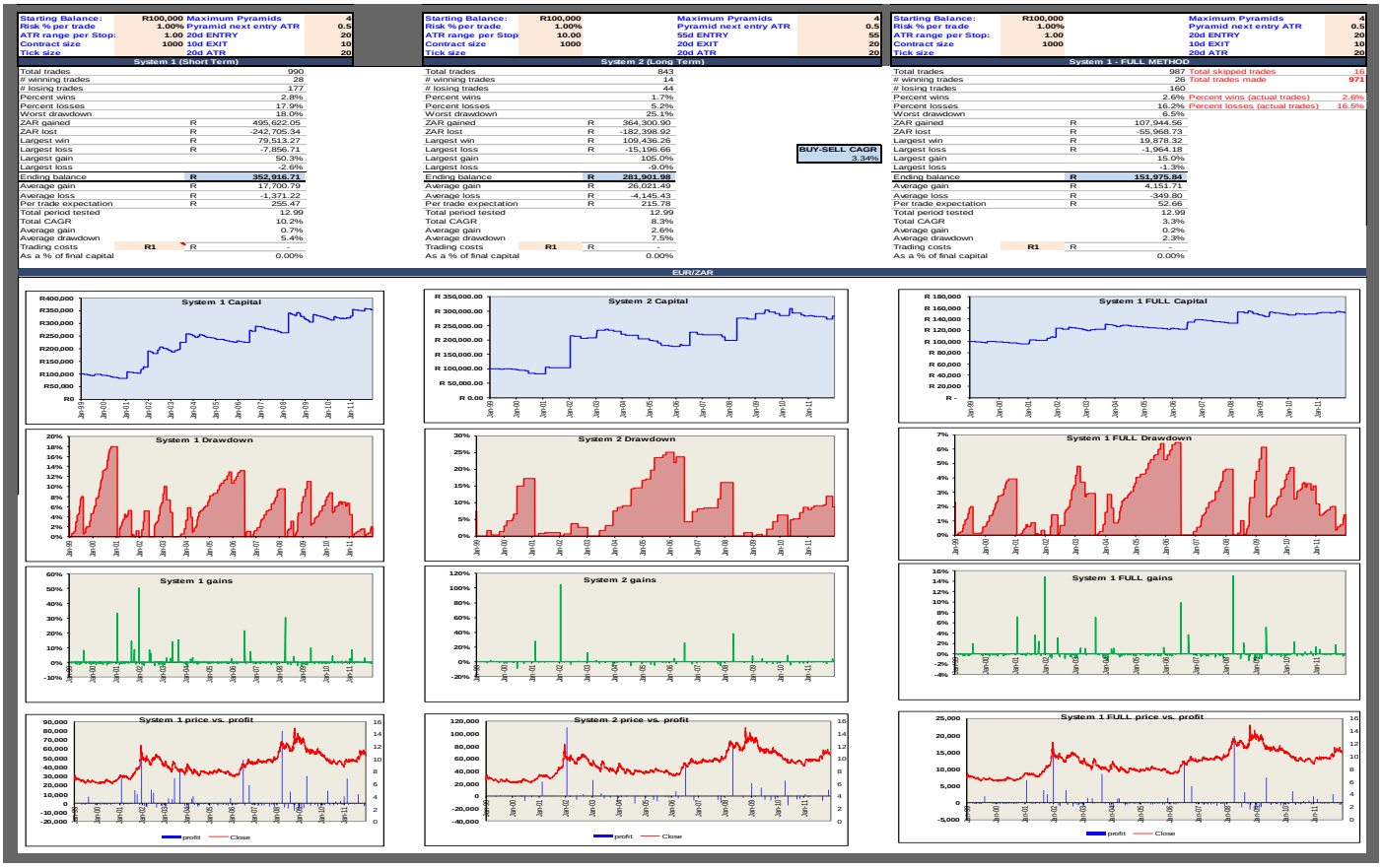
Out-of-sample results (2012-2014)

Initial backtesting results (initial period)



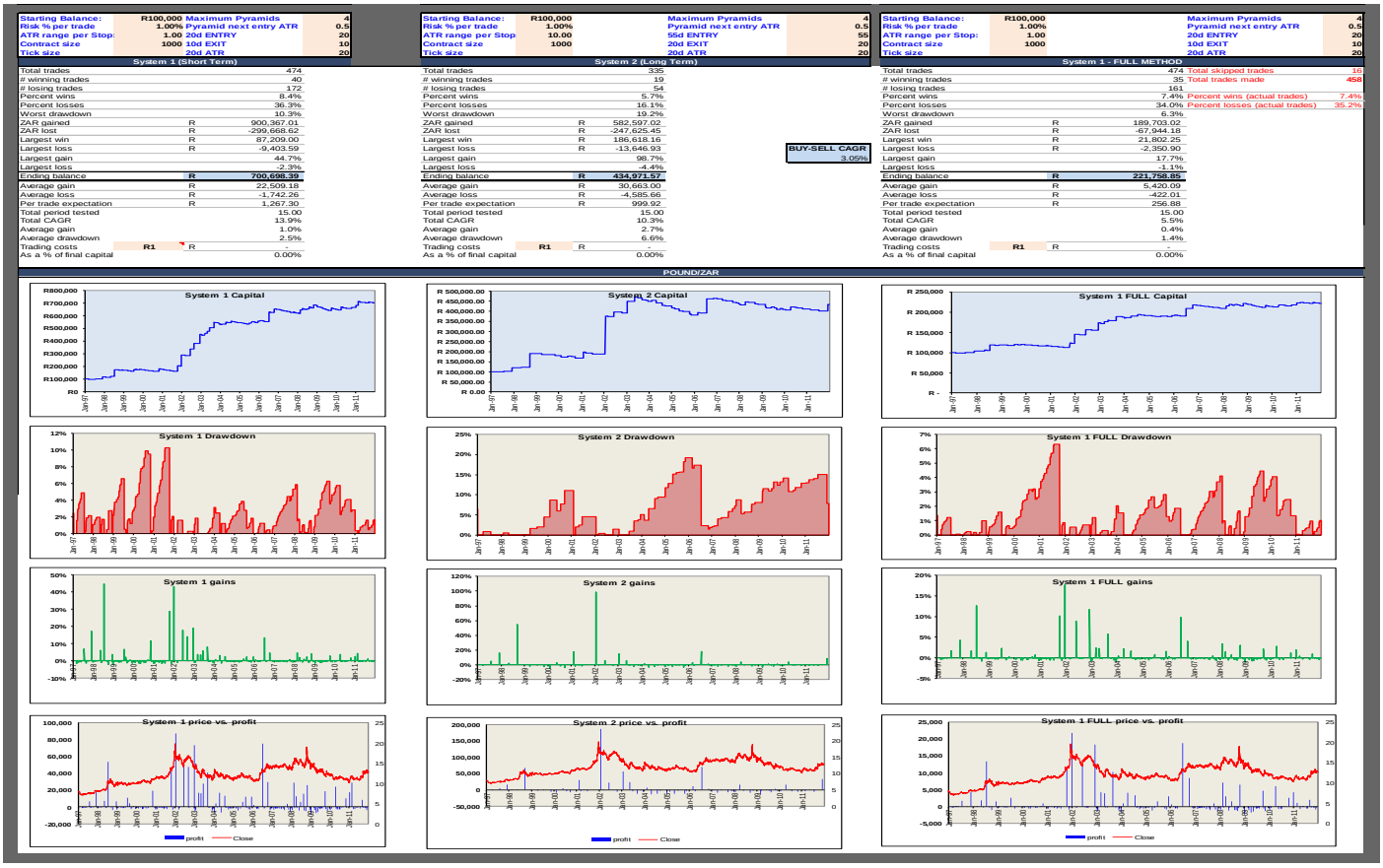
Out-of-sample results (2012-2014)

Initial backtesting results (initial period)

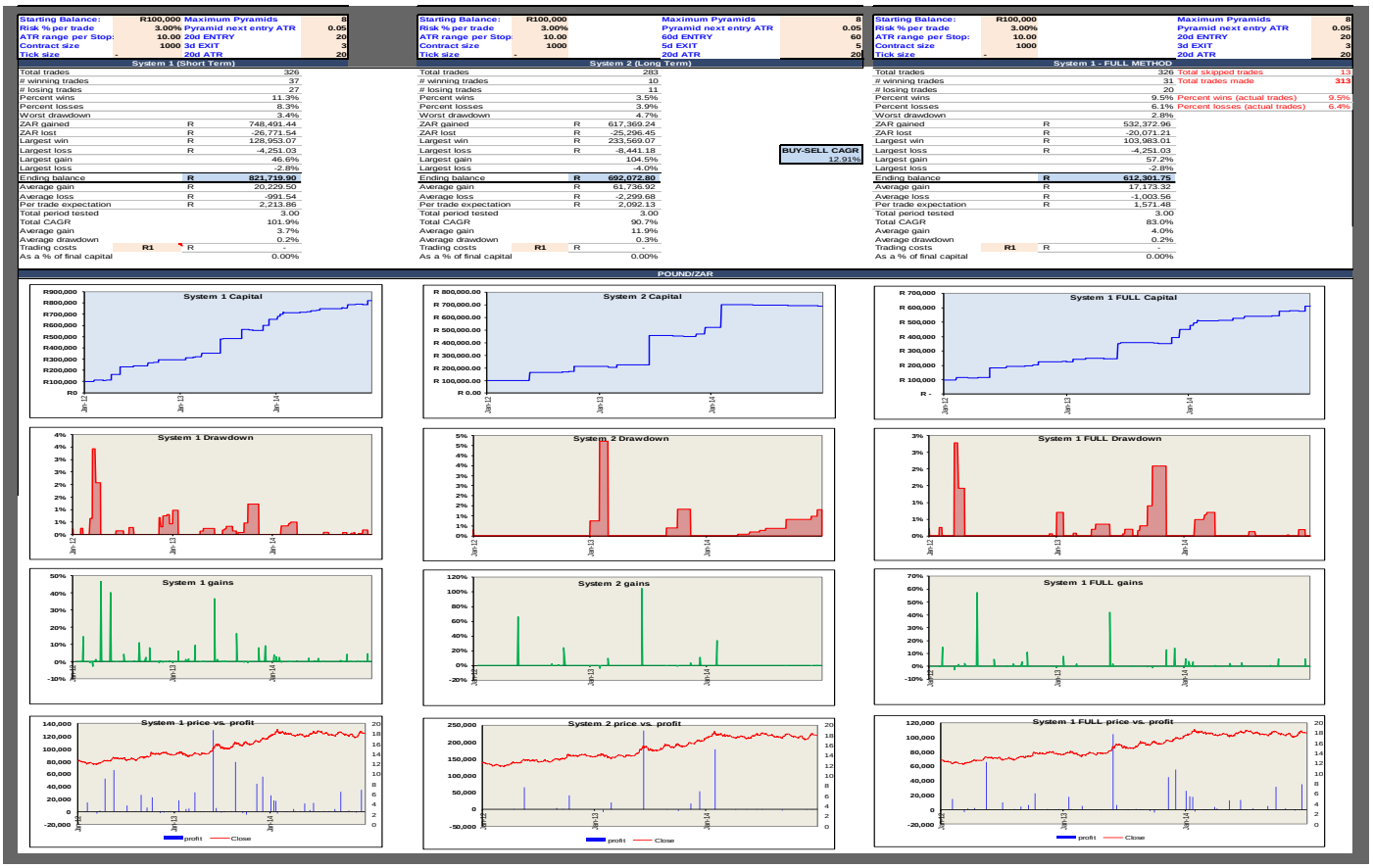


Out-of-sample results (2012-2014)

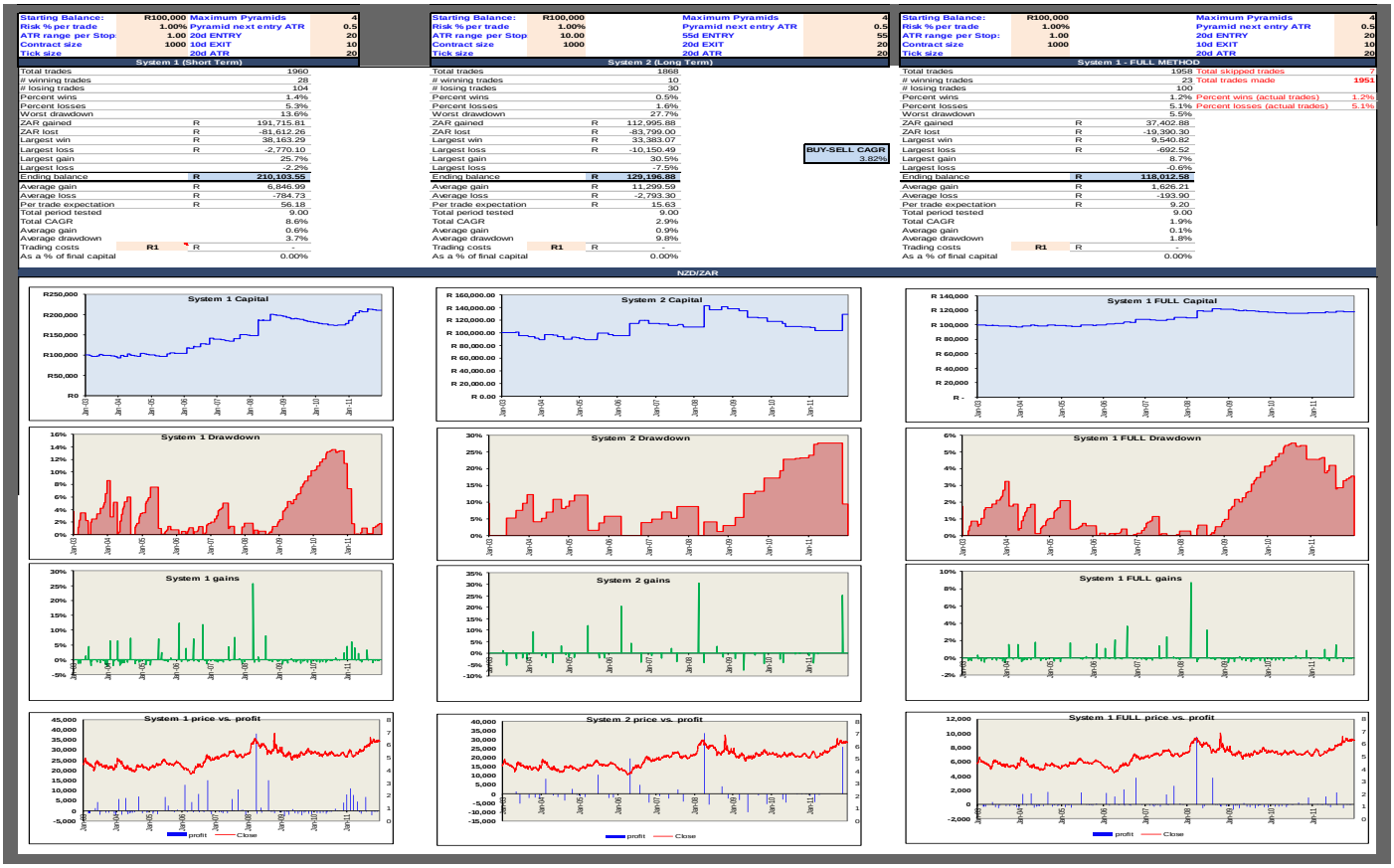
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)



Initial backtesting results (initial period)



Starting Balance:	R100,000	Maximum Pyramids	4
Risk % per trade	1.00%	Pyramid next entry ATR	0.5
ATR range per Stop:	1.00	20d ENTRY	20
Contract size	1000	10d EXIT	10
Tick size		20d ATR	20

System 1 (Short Term)

Total trades		1960
# winning trades		28
# losing trades		104
Percent wins		1.4%
Percent losses		5.3%
Worst drawdown		13.6%
ZAR gained	R	191,715.81
ZAR lost	R	-81,612.26
Largest win	R	38,163.29
Largest loss	R	-2,770.10
Largest gain		25.7%
Largest loss		-2.2%
Ending balance	R	210,103.55
Average gain	R	6,846.99
Average loss	R	-784.73
Per trade expectation	R	56.18
Total period tested		9.00
Total CAGR		8.6%
Average gain		0.6%
Average drawdown		3.7%
Trading costs	R1	R -
As a % of final capital		0.00%

Starting Balance:	R100,000	Maximum Pyramids	4
Risk % per trade	1.00%	Pyramid next entry ATR	0.5
ATR range per Stop	10.00	55d ENTRY	55
Contract size	1000	20d EXIT	20
Tick size		20d ATR	20

System 2 (Long Term)

Total trades		1868
# winning trades		10
# losing trades		30
Percent wins		0.5%
Percent losses		1.6%
Worst drawdown		27.7%
ZAR gained	R	112,995.88
ZAR lost	R	-83,799.00
Largest win	R	33,383.07
Largest loss	R	-10,150.49
Largest gain		30.5%
Largest loss		-7.5%
Ending balance	R	129,196.88
Average gain	R	11,299.59
Average loss	R	-2,793.30
Per trade expectation	R	15.63
Total period tested		9.00
Total CAGR		2.9%
Average gain		0.9%
Average drawdown		9.8%
Trading costs	R1	R -
As a % of final capital		0.00%

BUY-SELL CAGR
3.82%

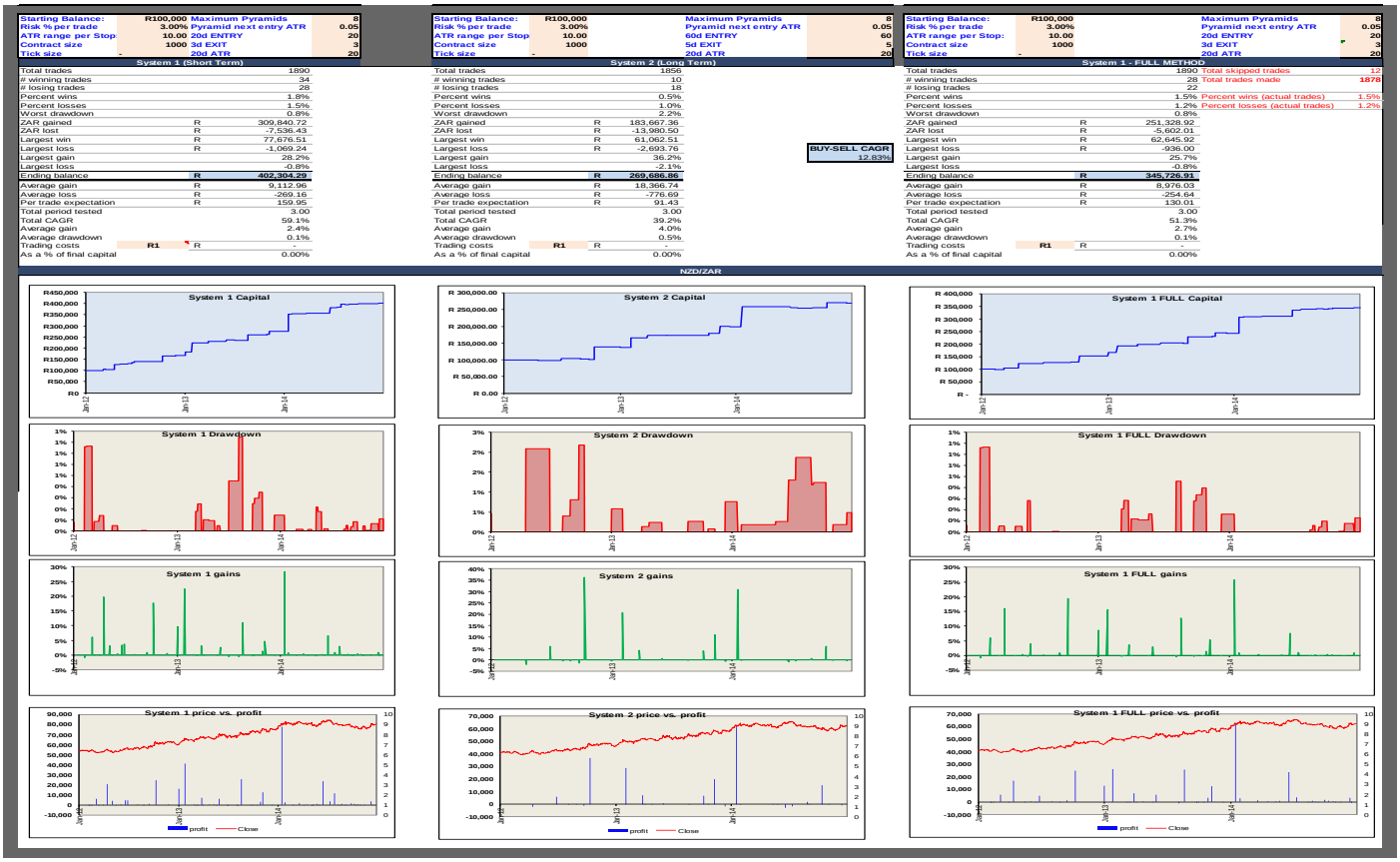
Starting Balance:	R100,000	Maximum Pyramids	4
Risk % per trade	1.00%	Pyramid next entry ATR	0.5
ATR range per Stop:	1.00	20d ENTRY	20
Contract size	1000	10d EXIT	10
Tick size		20d ATR	20

System 1 - FULL METHOD

Total trades		1958	Total skipped trades 7
# winning trades		23	Total trades made 1951
# losing trades		100	
Percent wins		1.2%	Percent wins (actual trades) 1.2%
Percent losses		5.1%	Percent losses (actual trades) 5.1%
Worst drawdown		5.5%	
ZAR gained	R	37,402.88	
ZAR lost	R	-19,390.30	
Largest win	R	9,540.82	
Largest loss	R	-692.52	
Largest gain		8.7%	
Largest loss		-0.6%	
Ending balance	R	118,012.58	
Average gain	R	1,626.21	
Average loss	R	-193.90	
Per trade expectation	R	9.20	
Total period tested		9.00	
Total CAGR		1.9%	
Average gain		0.1%	
Average drawdown		1.8%	
Trading costs	R1	R -	
As a % of final capital		0.00%	

NZD/ZAR

Out-of-sample results (2012-2014)



Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	3.00%	Pyramid next entry ATR	0.05
ATR range per Stop	10.00	20d ENTRY	20
Contract size	1000	3d EXIT	3
Tick size	-	20d ATR	20

System 1 (Short Term)

Total trades		1890
# winning trades		34
# losing trades		28
Percent wins		1.8%
Percent losses		1.5%
Worst drawdown		0.8%
ZAR gained	R	309,840.72
ZAR lost	R	-7,536.43
Largest win	R	77,676.51
Largest loss	R	-1,069.24
Largest gain		28.2%
Largest loss		-0.8%
Ending balance	R	402,304.29
Average gain	R	9,112.96
Average loss	R	-269.16
Per trade expectation	R	159.95
Total period tested		3.00
Total CAGR		59.1%
Average gain		2.4%
Average drawdown		0.1%
Trading costs	R1	R -
As a % of final capital		0.00%

Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	3.00%	Pyramid next entry ATR	0.05
ATR range per Stop	10.00	60d ENTRY	60
Contract size	1000	5d EXIT	5
Tick size	-	20d ATR	20

System 2 (Long Term)

Total trades		1856
# winning trades		10
# losing trades		18
Percent wins		0.5%
Percent losses		1.0%
Worst drawdown		2.2%
ZAR gained	R	183,667.36
ZAR lost	R	-13,980.50
Largest win	R	61,062.51
Largest loss	R	-2,693.76
Largest gain		36.2%
Largest loss		-2.1%
Ending balance	R	269,686.86
Average gain	R	18,366.74
Average loss	R	-776.69
Per trade expectation	R	91.43
Total period tested		3.00
Total CAGR		39.2%
Average gain		4.0%
Average drawdown		0.5%
Trading costs	R1	R -
As a % of final capital		0.00%

BUY-SELL CAGR
12.83%

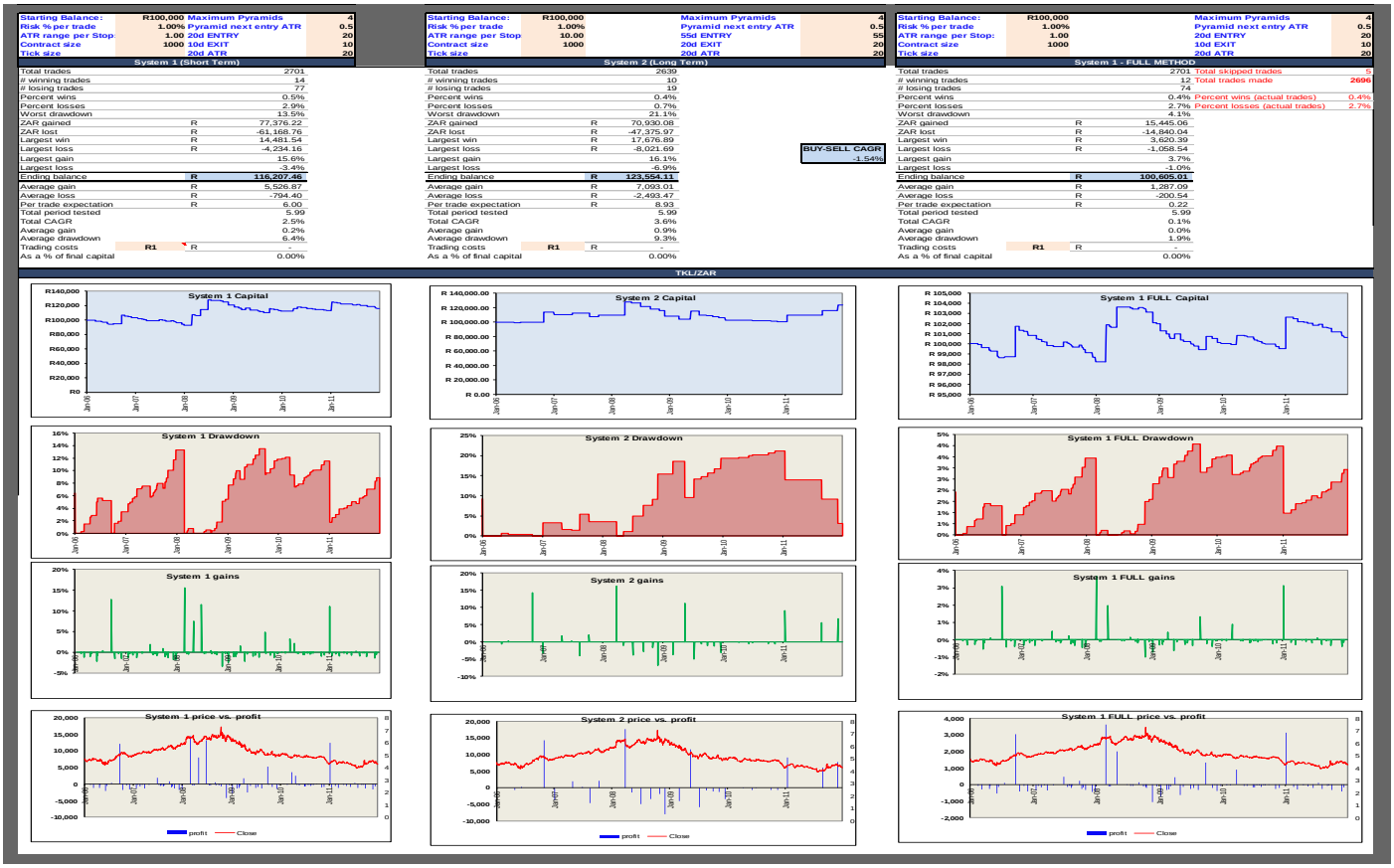
Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	3.00%	Pyramid next entry ATR	0.05
ATR range per Stop:	10.00	20d ENTRY	20
Contract size	1000	3d EXIT	3
Tick size	-	20d ATR	20

System 1 - FULL METHOD

Total trades		1890	Total skipped trades 12
# winning trades		28	Total trades made 1878
# losing trades		22	
Percent wins		1.5%	Percent wins (actual trades) 1.5%
Percent losses		1.2%	Percent losses (actual trades) 1.2%
Worst drawdown		0.8%	
ZAR gained	R	251,328.92	
ZAR lost	R	-5,602.01	
Largest win	R	62,645.92	
Largest loss	R	-936.00	
Largest gain		25.7%	
Largest loss		-0.8%	
Ending balance	R	345,726.91	
Average gain	R	8,976.03	
Average loss	R	-254.64	
Per trade expectation	R	130.01	
Total period tested		3.00	
Total CAGR		51.3%	
Average gain		2.7%	
Average drawdown		0.1%	
Trading costs	R1	R -	
As a % of final capital		0.00%	

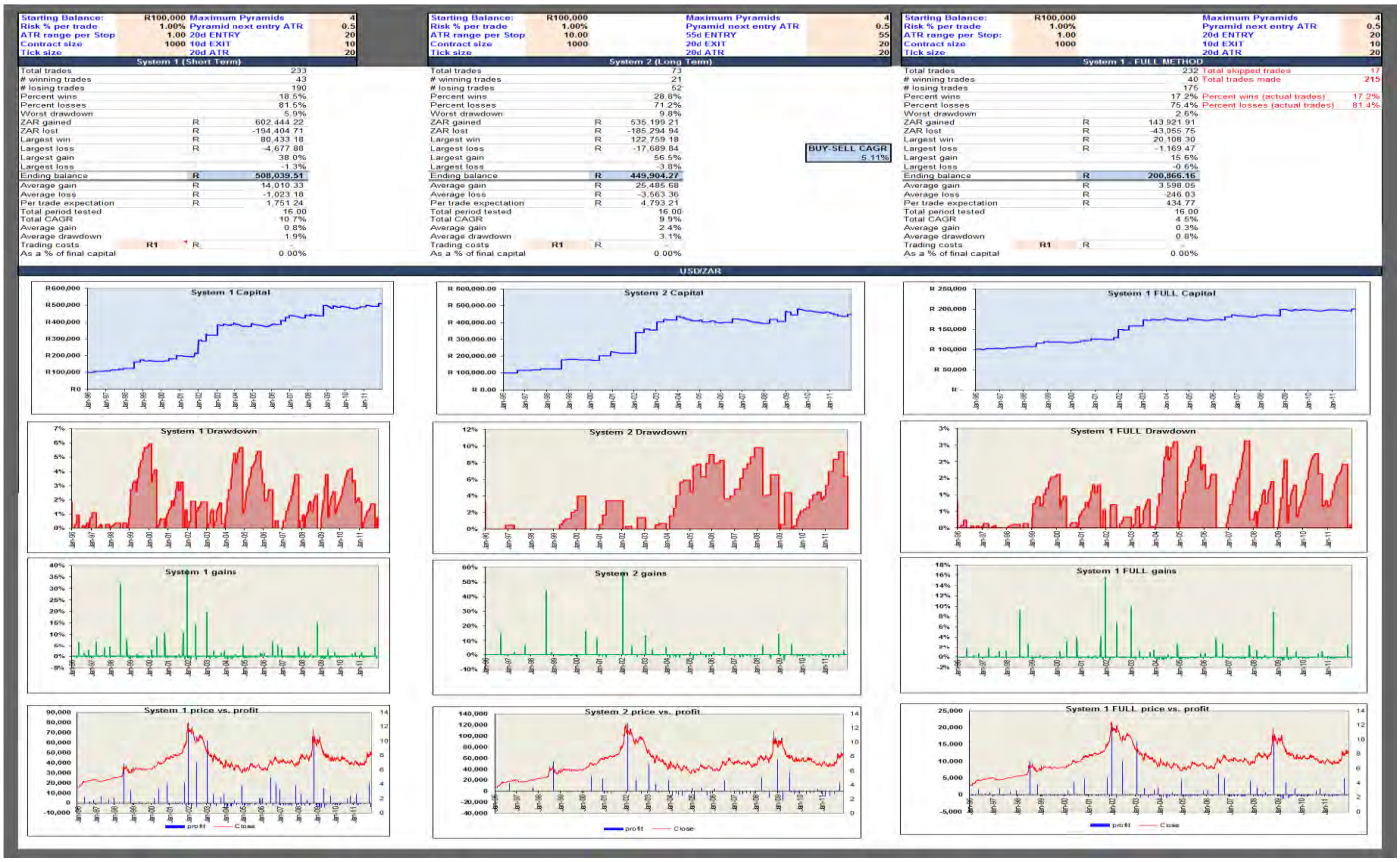
NZD/ZAR

Initial backtesting results (initial period)



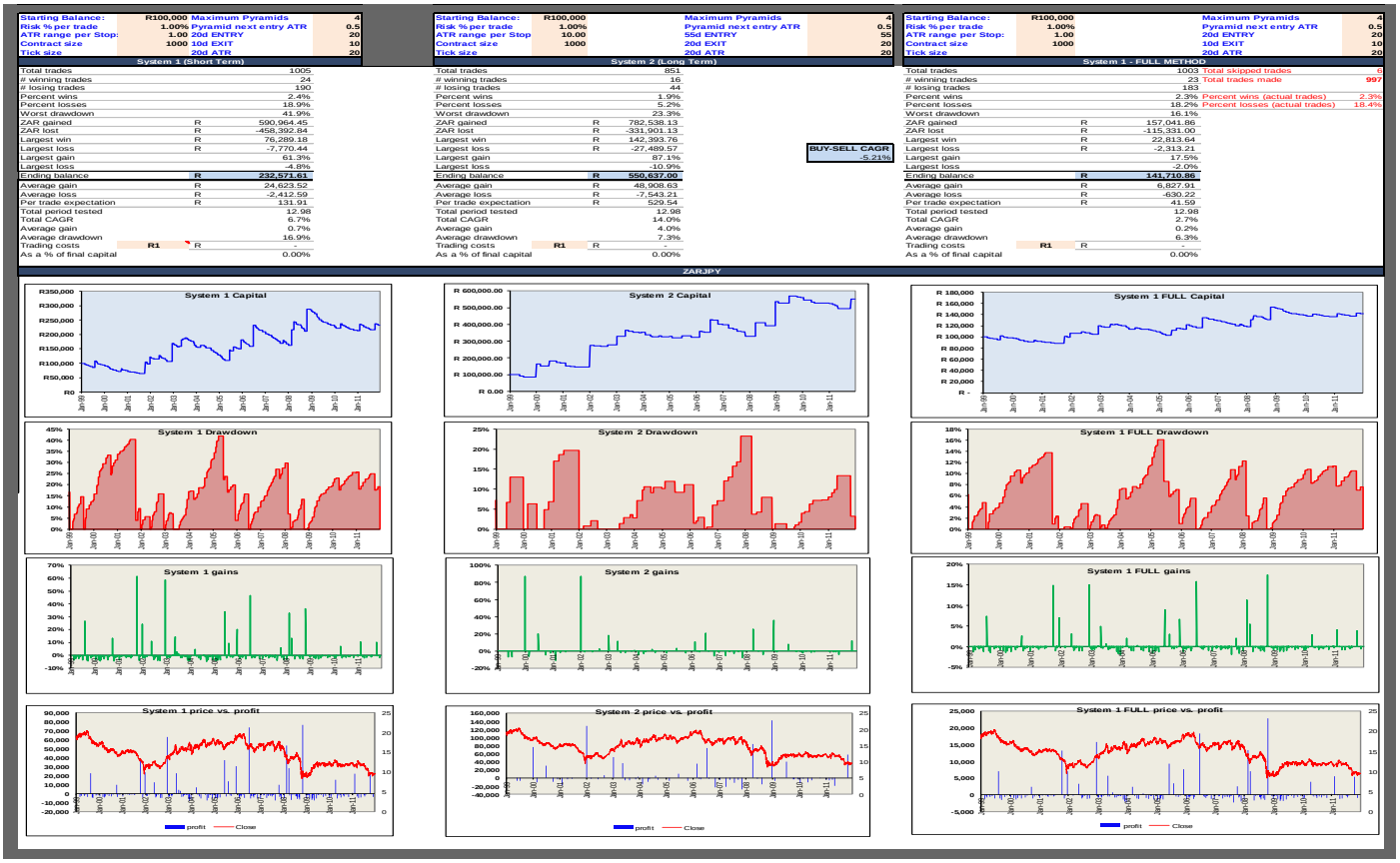
Out-of-sample results (2012-2014)

Initial backtesting results (initial period)

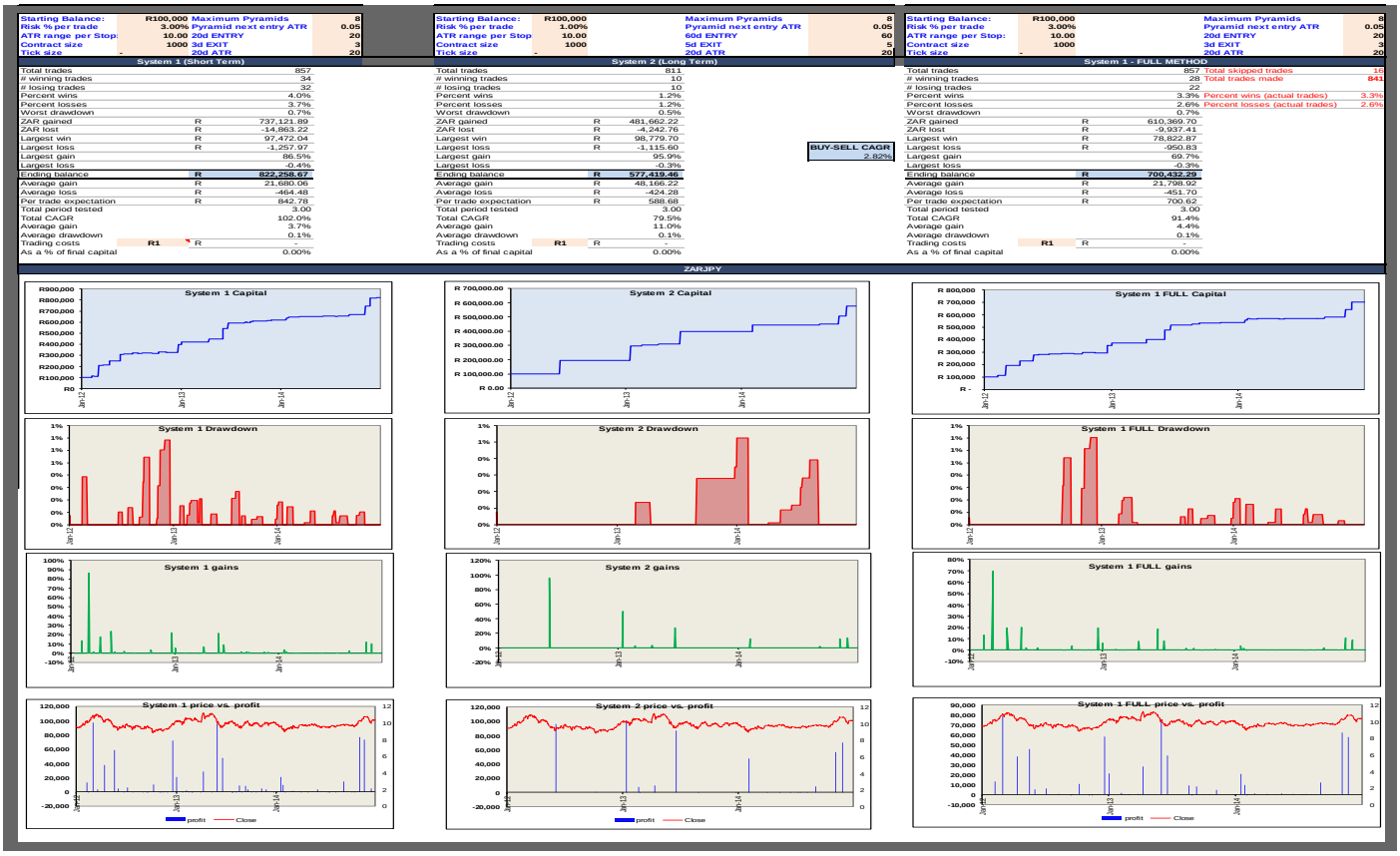


Out-of-sample results (2012-2014)

Initial backtesting results (initial period)

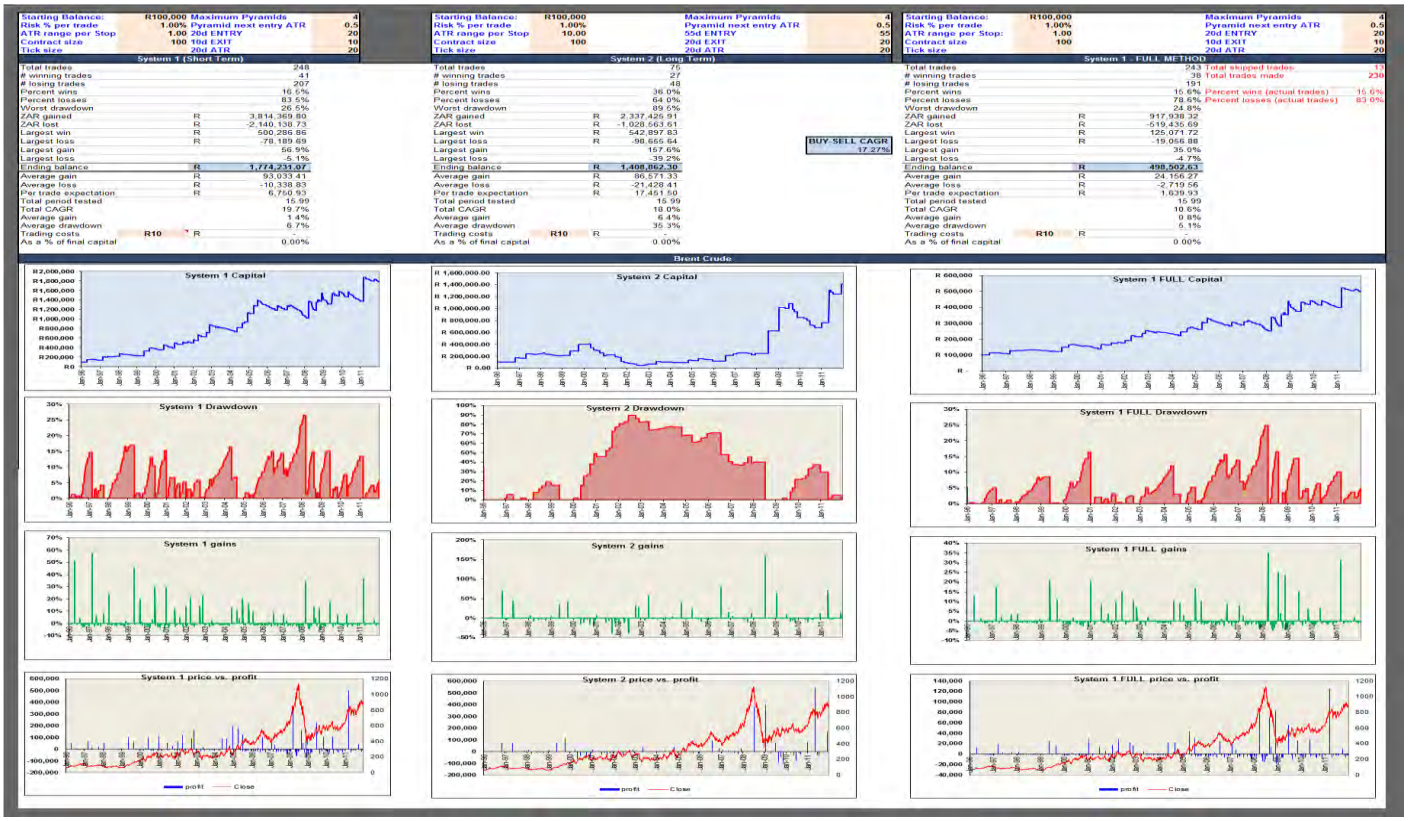


Out-of-sample results (2012-2014)

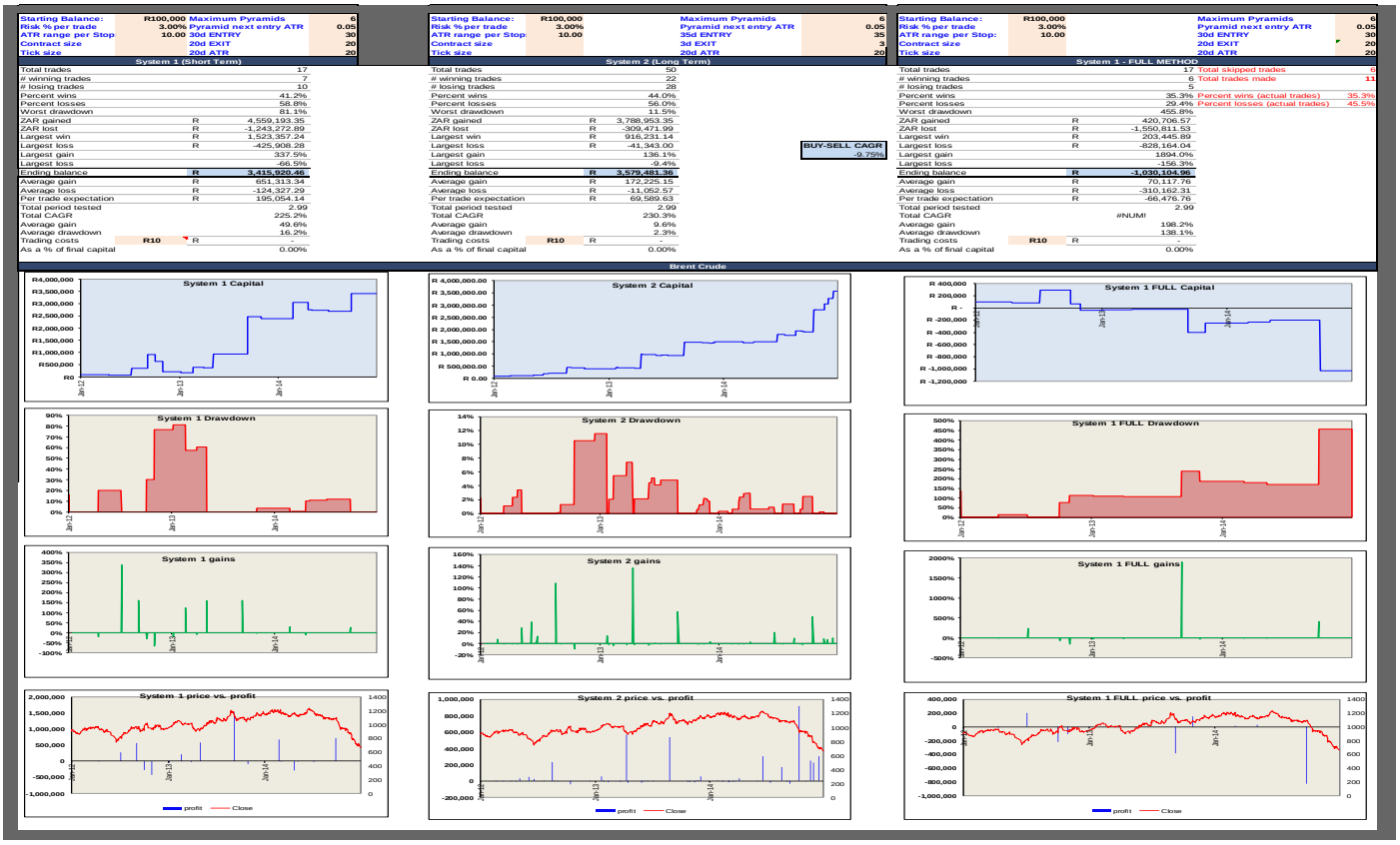


Energy

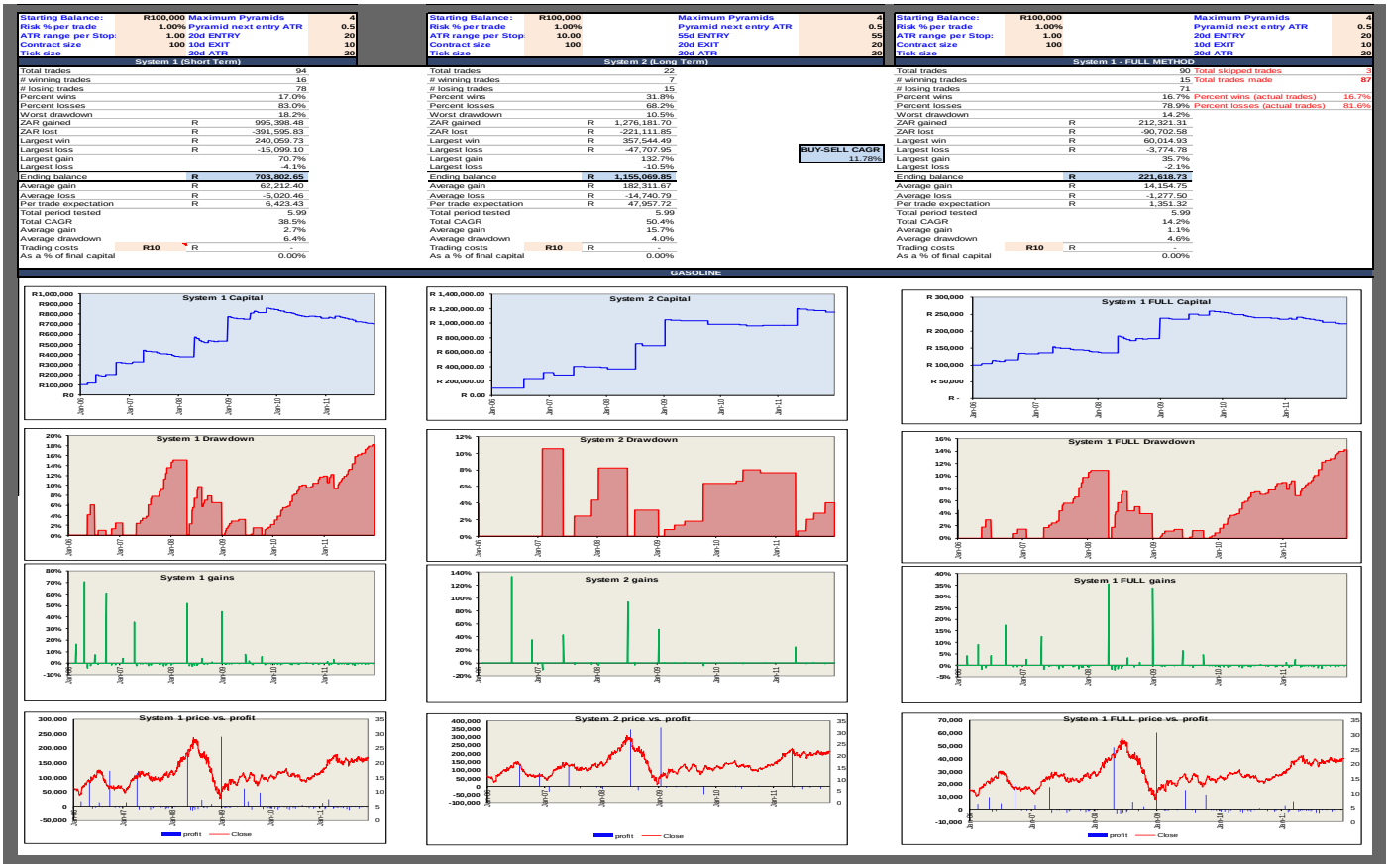
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)

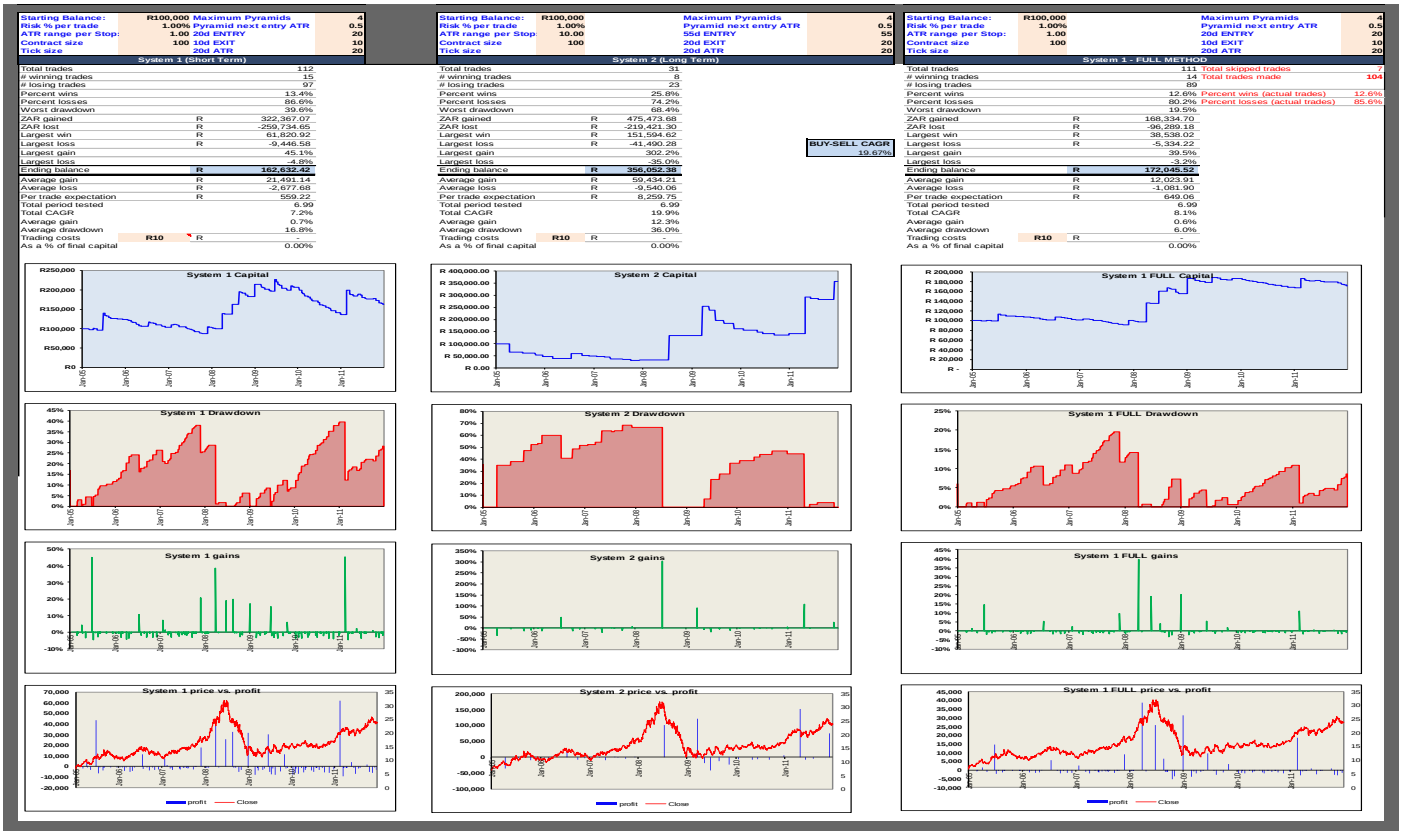


Initial backtesting results (initial period)

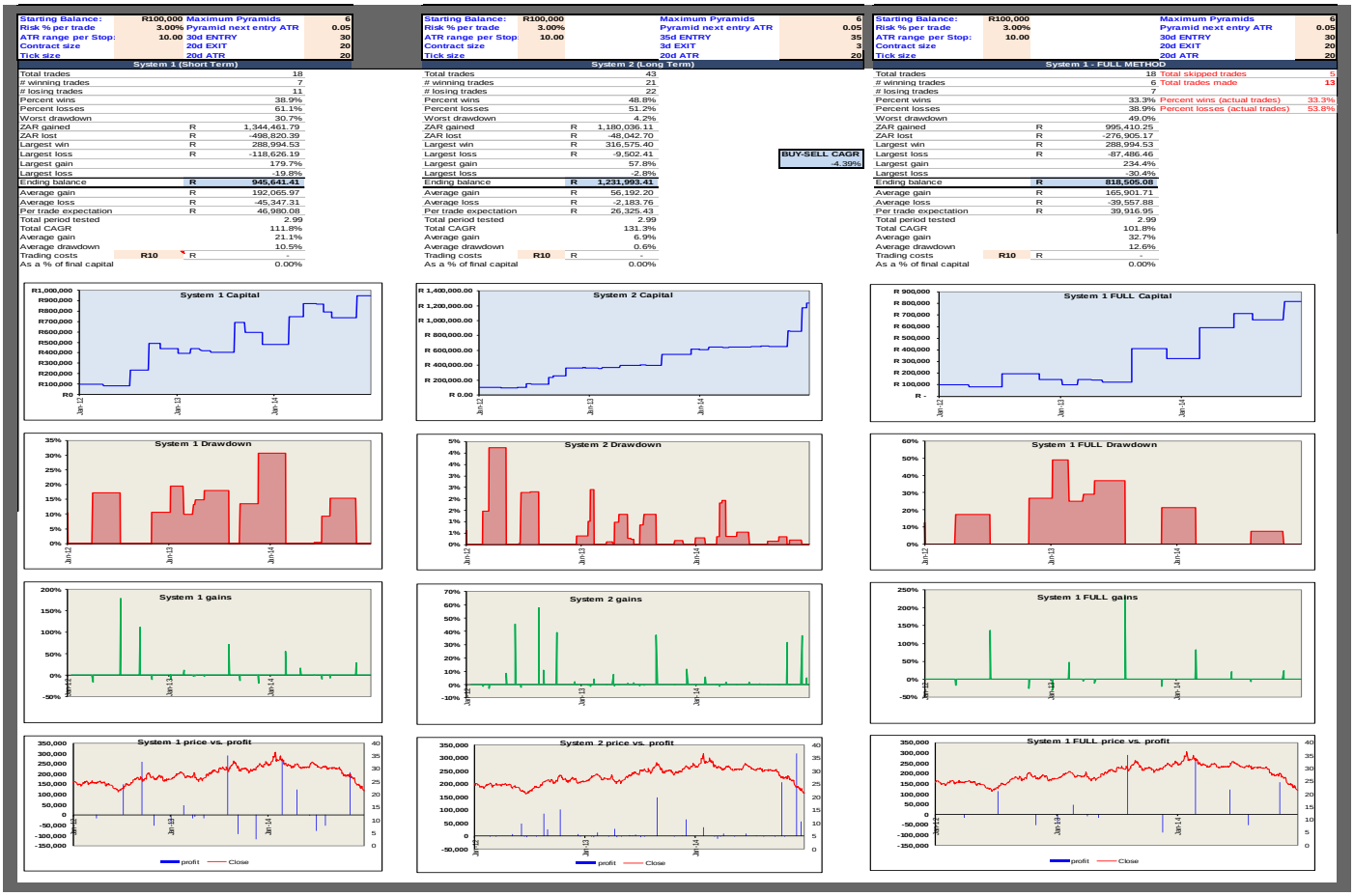


Out-of-sample results (2012-2014)

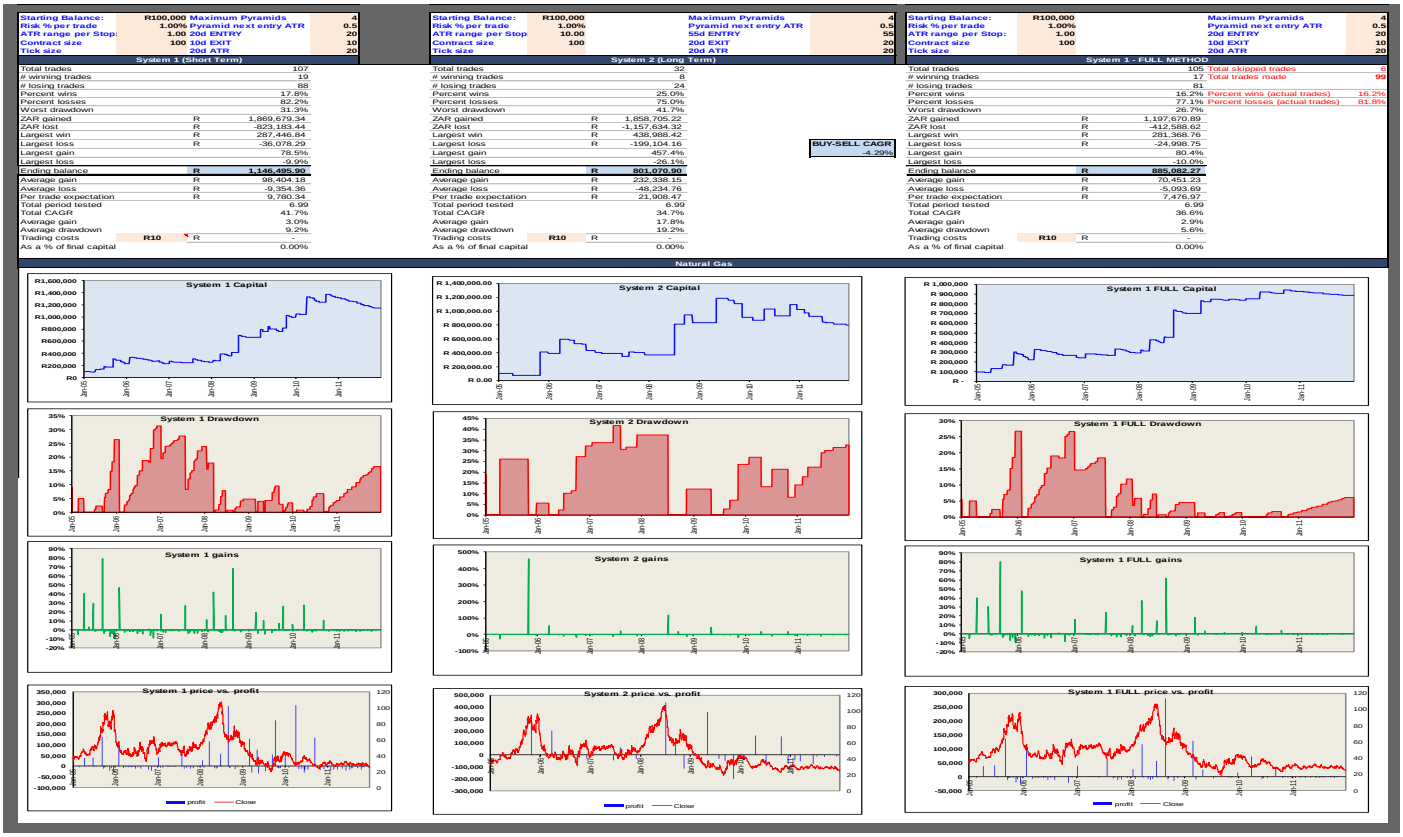
Initial backtesting results (initial period)



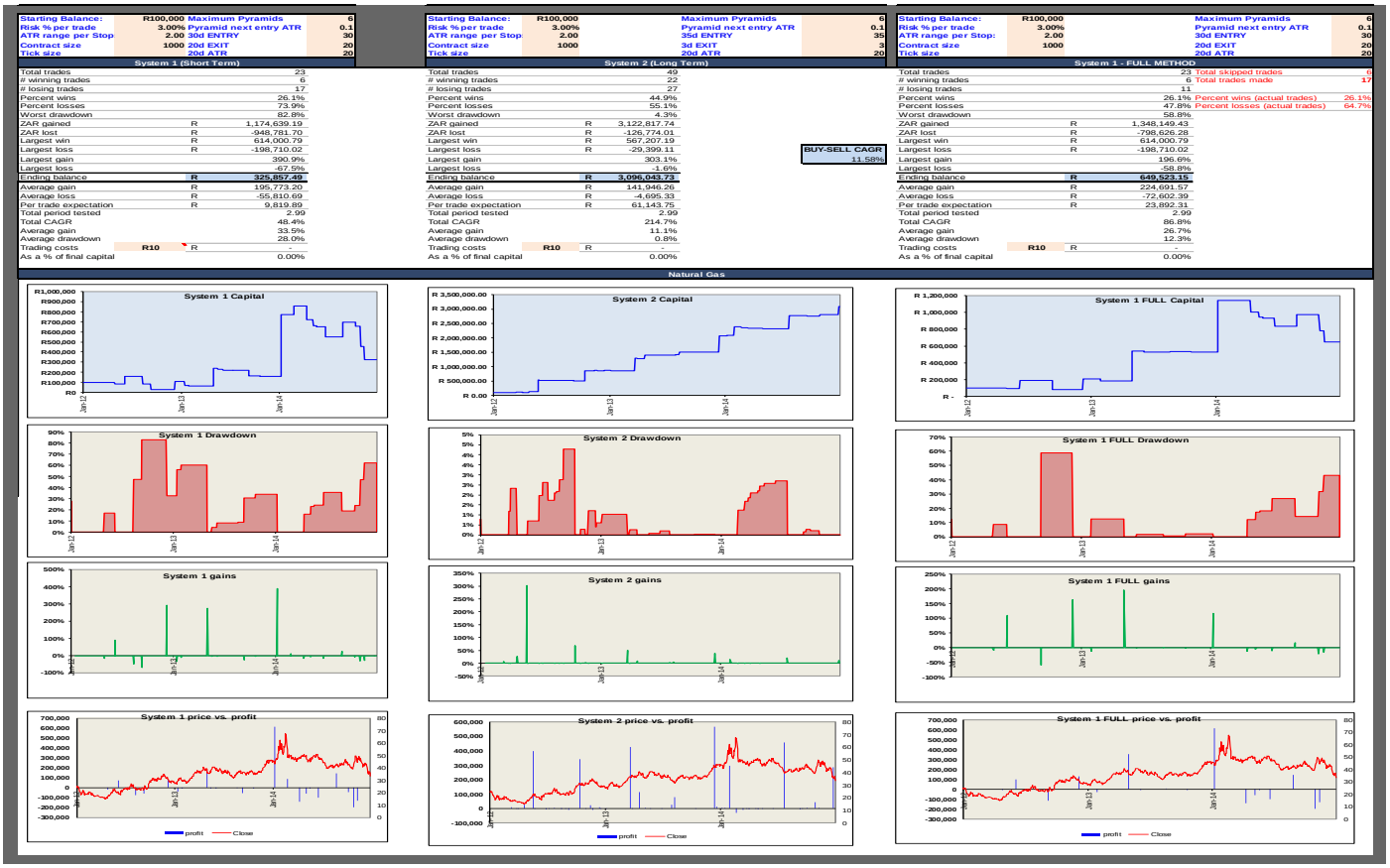
Out-of-sample results (2012-2014)



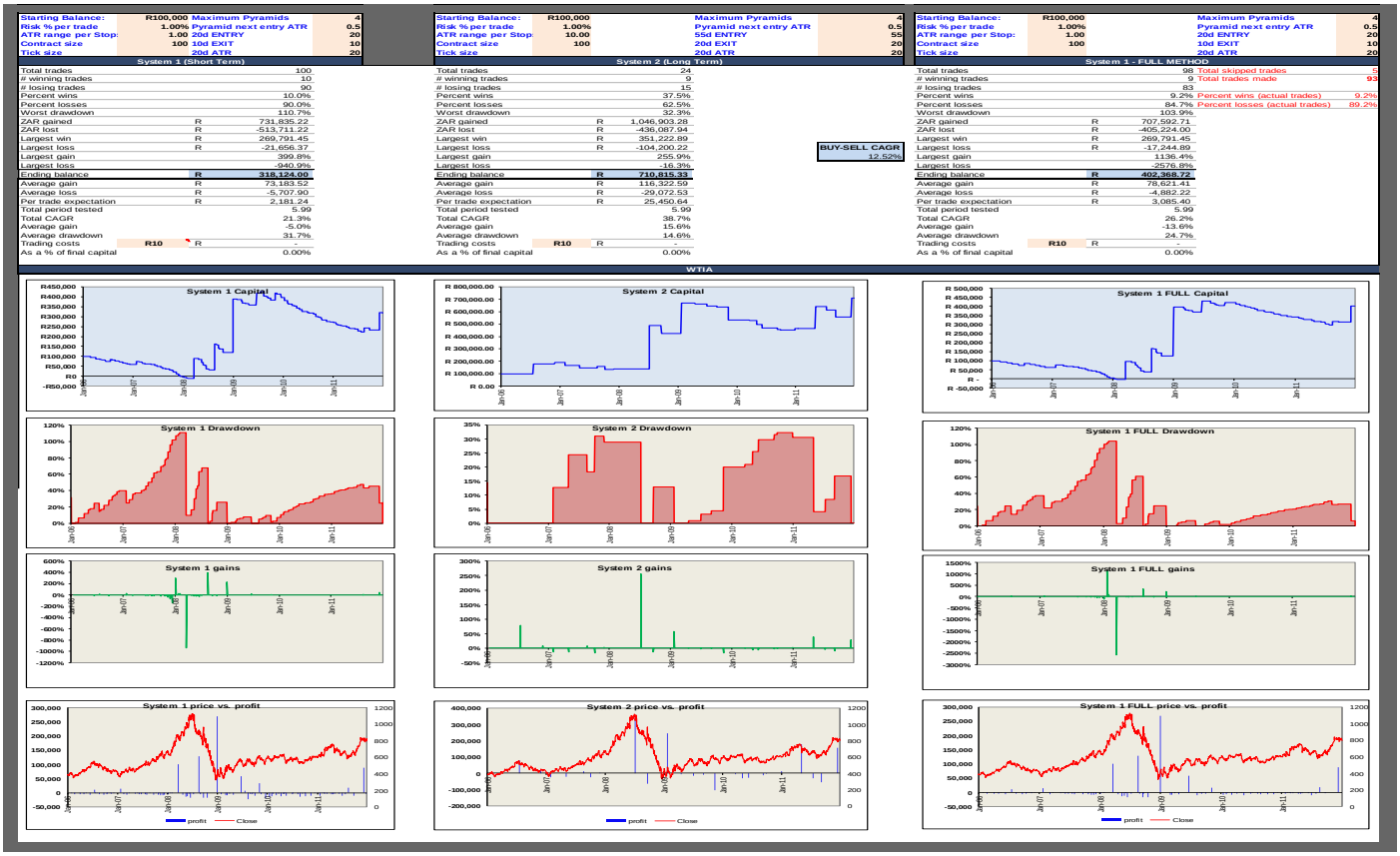
Initial backtesting results (initial period)



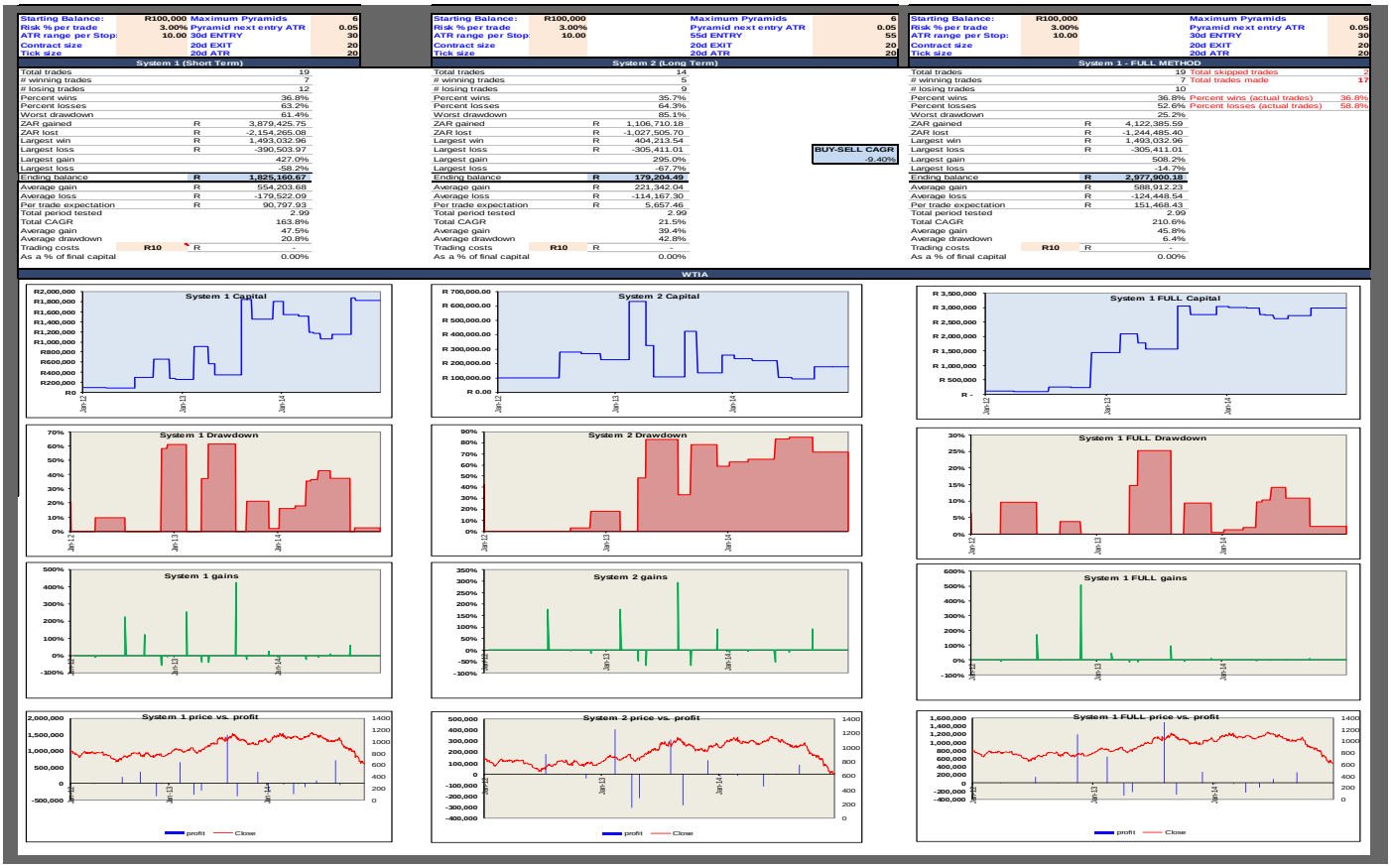
Out-of-sample results (2012-2014)



Initial backtesting results (initial period)

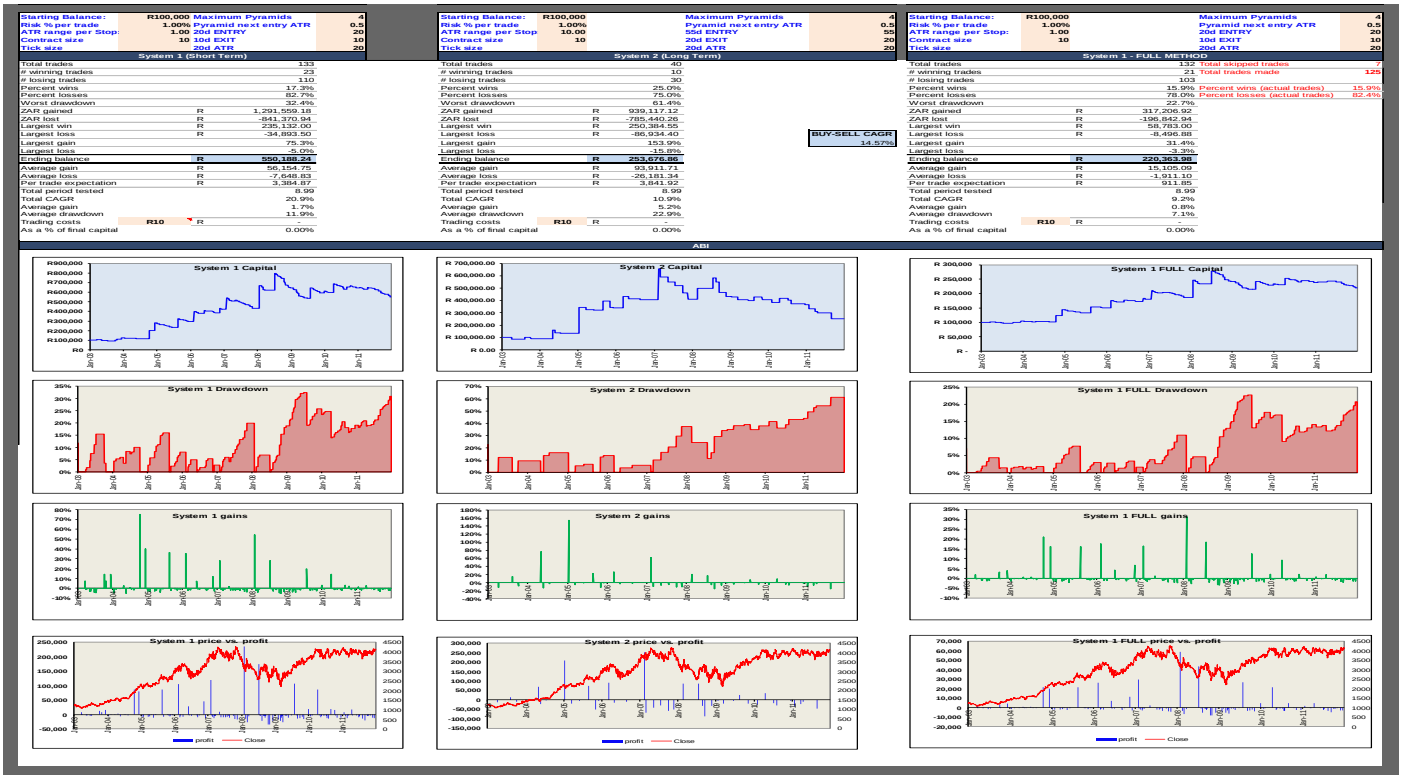


Out-of-sample results (2012-2014)

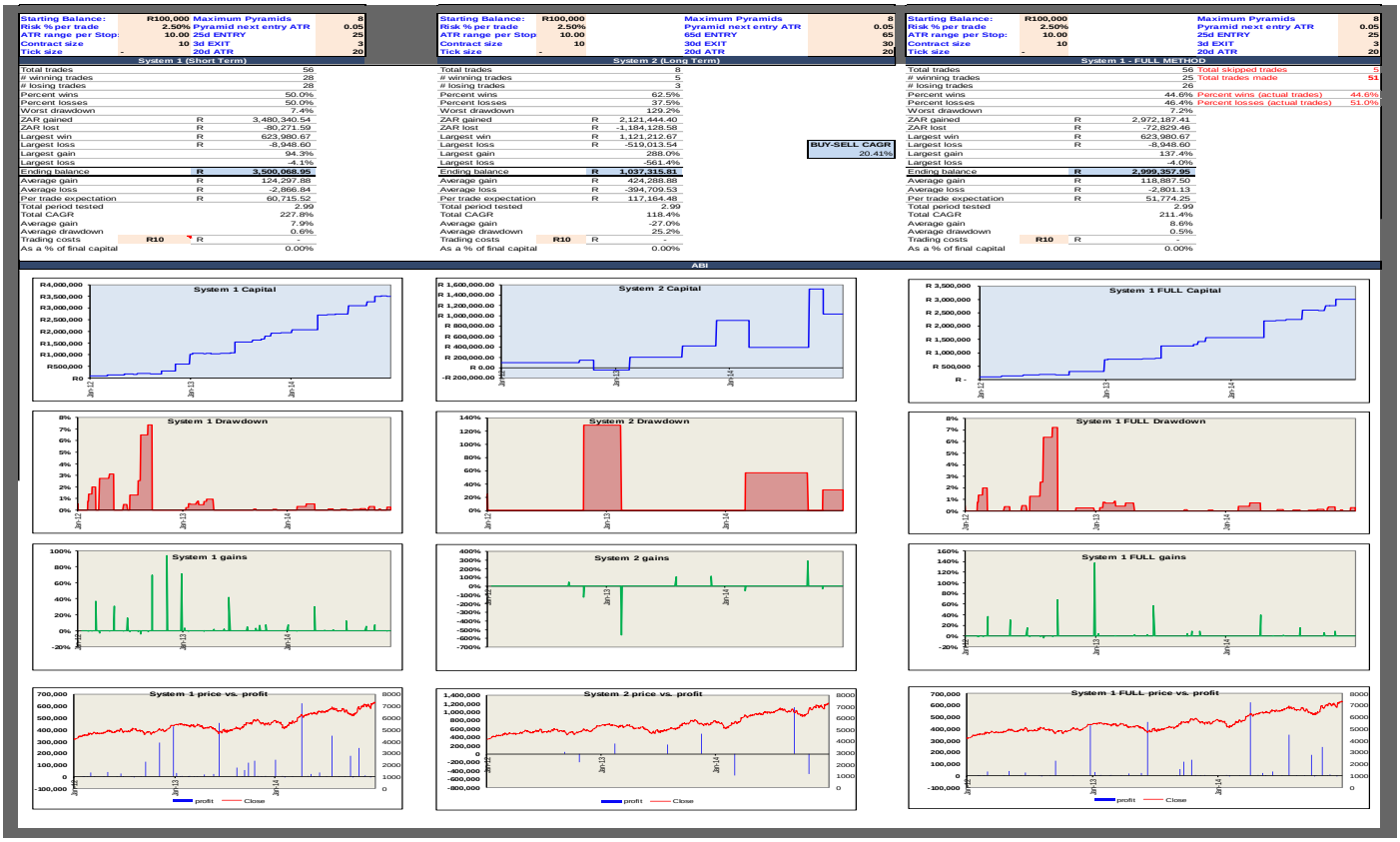


Equity Indices

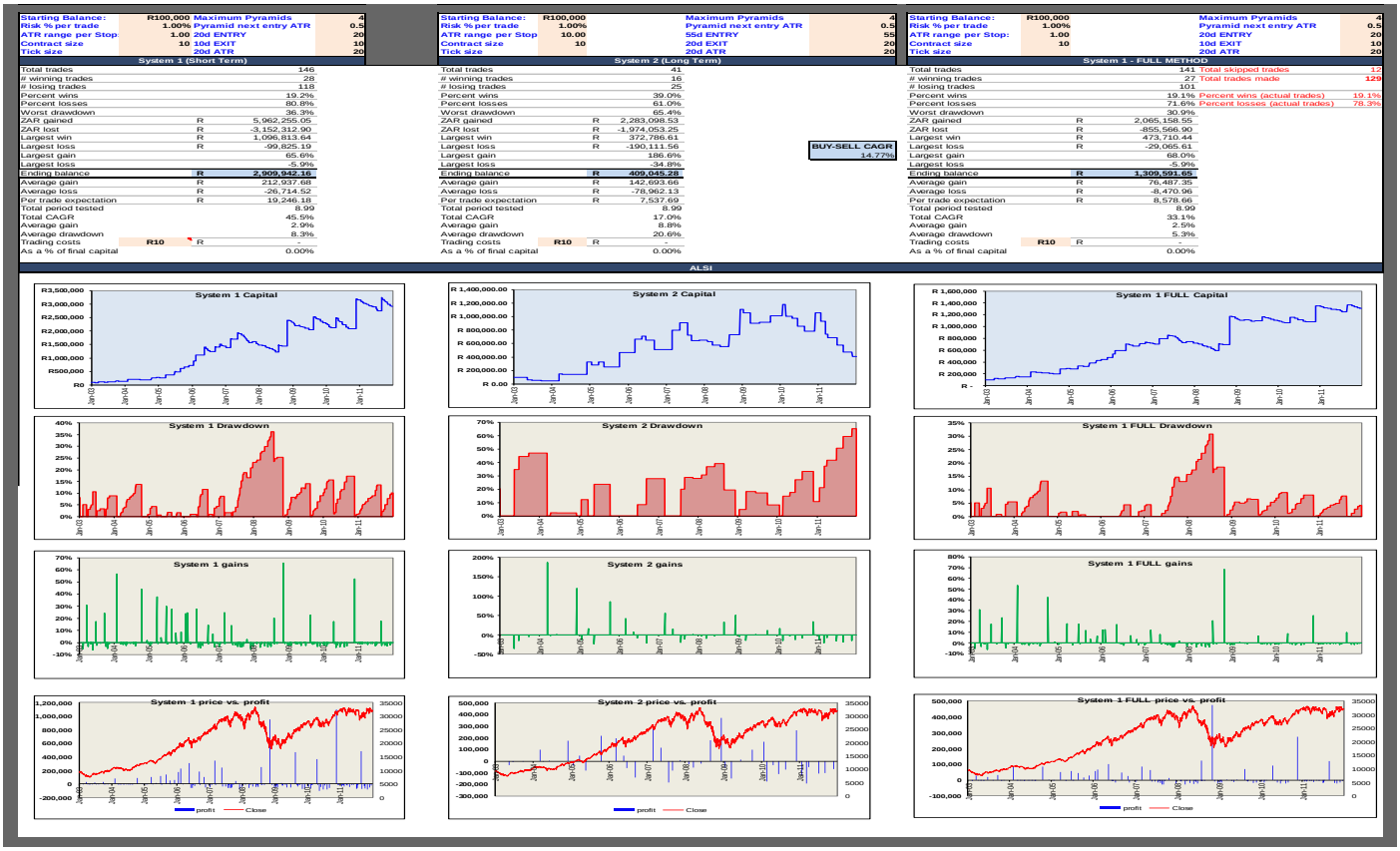
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)

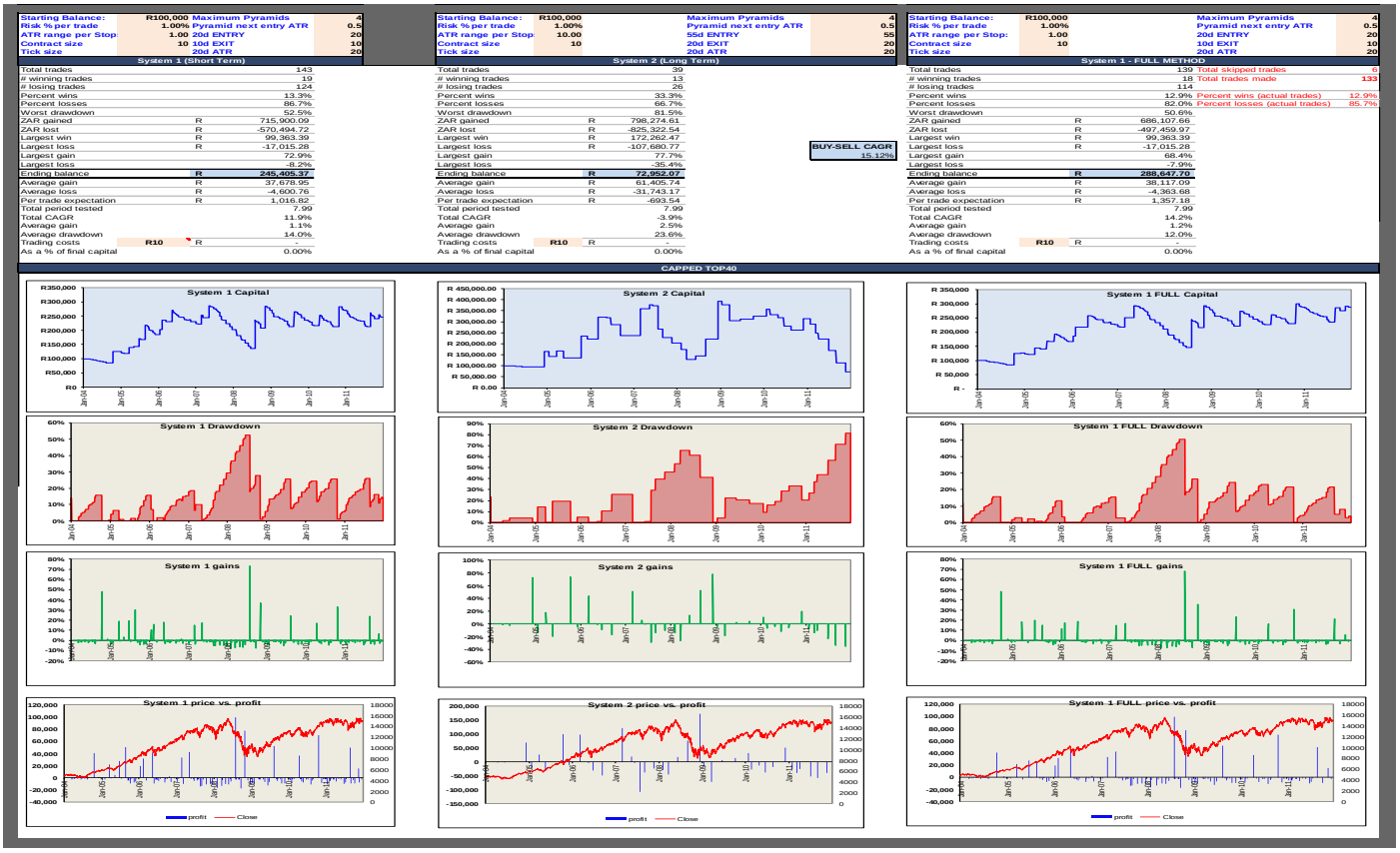


Initial backtesting results (initial period)

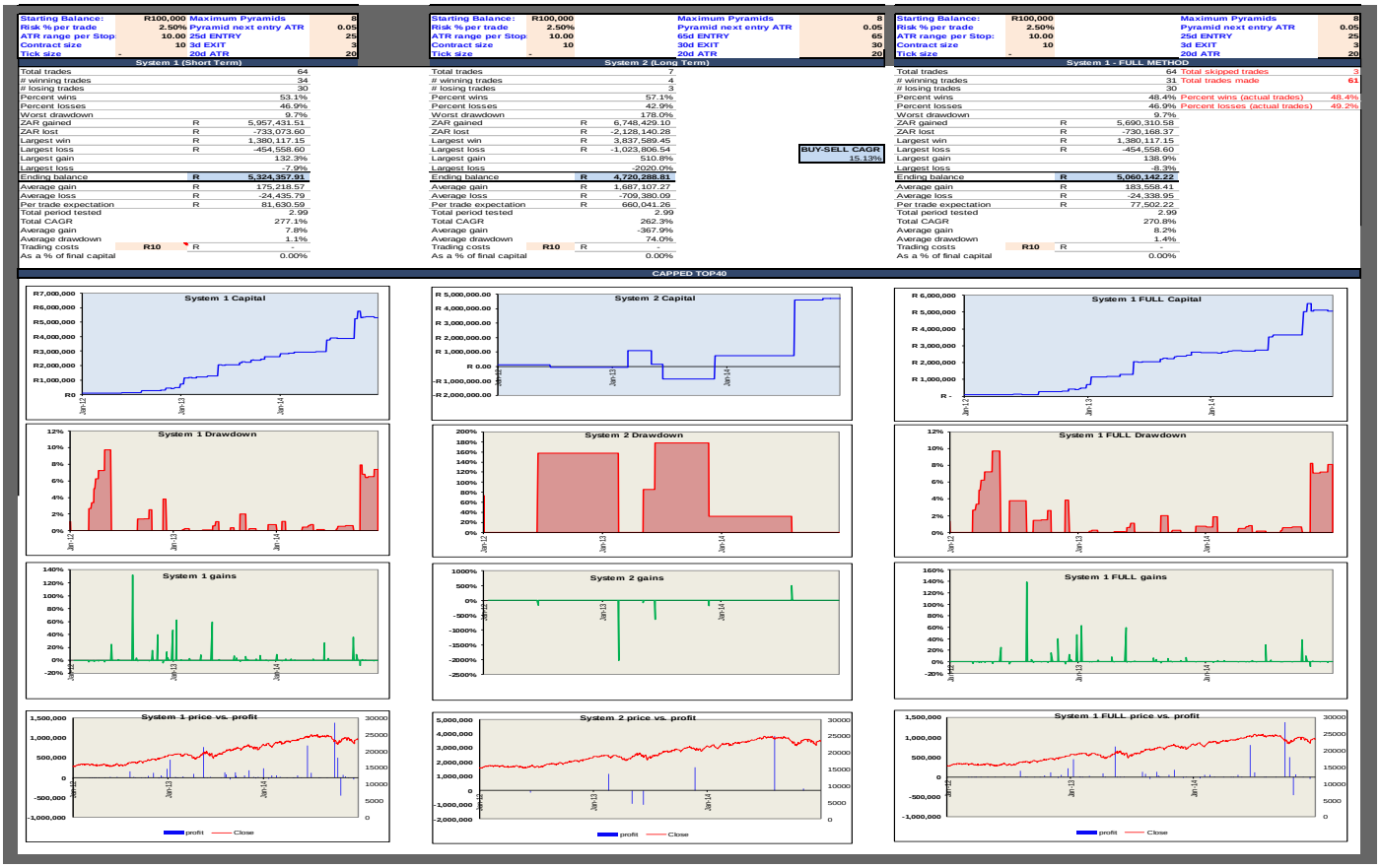


Out-of-sample results (2012-2014)

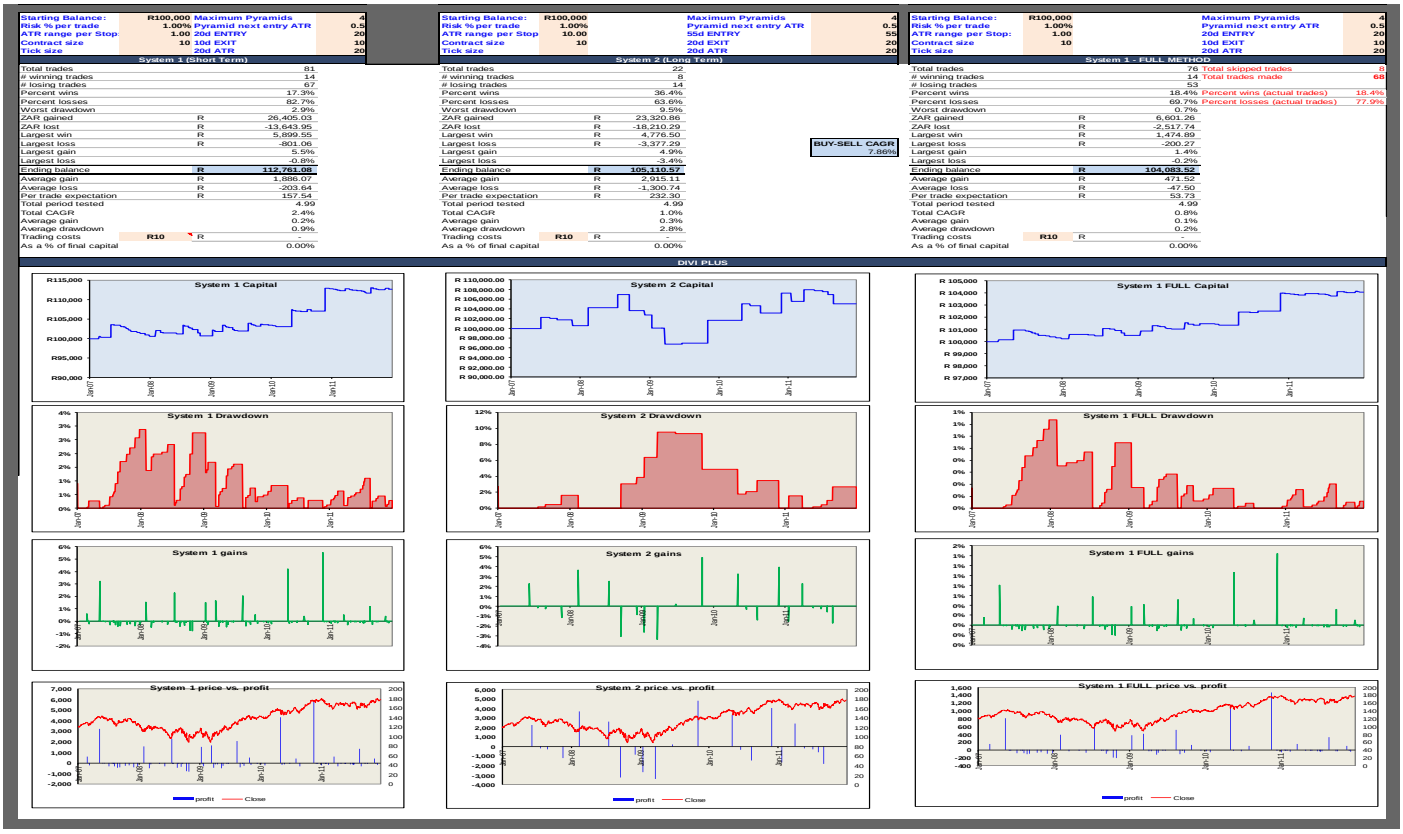
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)



Initial backtesting results (initial period)



Out-of-sample results (2012-2014)

Out-of-sample results (2012-2014)

Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	2.50%	Pyramid next entry ATR	0.05
ATR range per Stop:	10.00	25d ENTRY	25
Contract size	10	3d EXIT	3
Tick size	-	20d ATR	20

System 1 (Short Term)

Total trades		79
# winning trades		42
# losing trades		37
Percent wins		53.2%
Percent losses		46.8%
Worst drawdown		15.6%
ZAR gained	R	9,237,093.38
ZAR lost	R	-354,468.42
Largest win	R	2,488,708.82
Largest loss	R	-46,391.36
Largest gain		113.2%
Largest loss		-8.1%
Ending balance	R	8,982,624.95
Average gain	R	219,930.79
Average loss	R	-9,580.23
Per trade expectation	R	112,438.29
Total period tested		4.0
Total CAGR		208.3%
Average gain		7.4%
Average drawdown		1.2%
Trading costs	R10	-
As a % of final capital		0.00%

Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	2.50%	Pyramid next entry ATR	0.05
ATR range per Stop	10.00	65d ENTRY	65
Contract size	10	30d EXIT	30
Tick size	-	20d ATR	20

System 2 (Long Term)

Total trades		11
# winning trades		4
# losing trades		7
Percent wins		36.4%
Percent losses		63.6%
Worst drawdown		478.7%
ZAR gained	R	9,839,531.69
ZAR lost	R	-2,902,361.99
Largest win	R	4,383,478.45
Largest loss	R	-1,040,115.45
Largest gain		1155.5%
Largest loss		-453.9%
Ending balance	R	7,037,169.70
Average gain	R	2,459,882.92
Average loss	R	-414,623.14
Per trade expectation	R	630,651.79
Total period tested		4.0
Total CAGR		190.1%
Average gain		84.6%
Average drawdown		97.2%
Trading costs	R10	-
As a % of final capital		0.00%

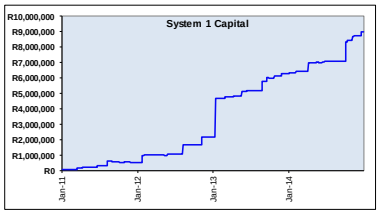
BUY-SELL CAGR	
10.29%	

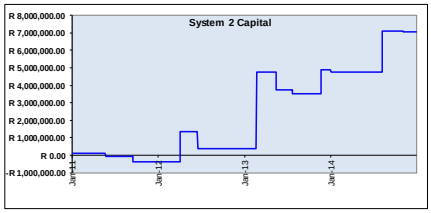
Starting Balance:	R100,000	Maximum Pyramids	8
Risk % per trade	2.50%	Pyramid next entry ATR	0.05
ATR range per Stop:	10.00	25d ENTRY	25
Contract size	10	3d EXIT	3
Tick size	-	20d ATR	20

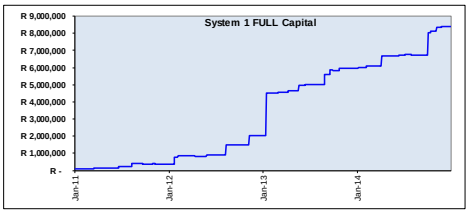
System 1 - FULL METHOD

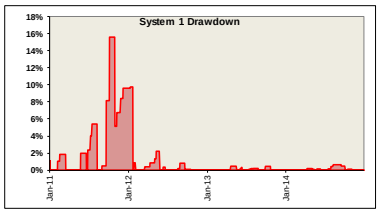
Total trades		79	Total skipped trades 5
# winning trades		37	Total trades made 74
# losing trades		37	
Percent wins		46.8%	Percent wins (actual trades) 46.8%
Percent losses		46.8%	Percent losses (actual trades) 50.0%
Worst drawdown		14.7%	
ZAR gained	R	8,575,625.06	
ZAR lost	R	-297,714.37	
Largest win	R	2,488,708.82	
Largest loss	R	-30,109.26	
Largest gain		123.2%	
Largest loss		-7.9%	
Ending balance	R	8,377,910.70	
Average gain	R	231,773.65	
Average loss	R	-8,046.33	
Per trade expectation	R	104,783.68	
Total period tested		4.0	
Total CAGR		203.0%	
Average gain		8.0%	
Average drawdown		1.2%	
Trading costs	R10	-	
As a % of final capital		0.00%	

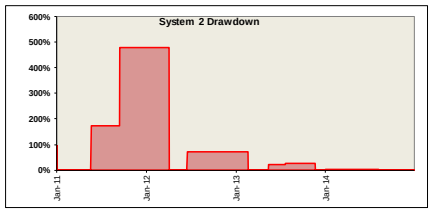
Equal Weighted TOP40

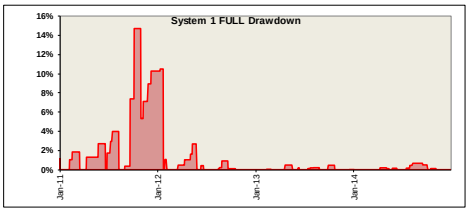


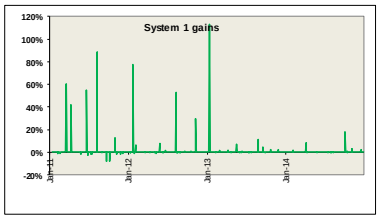


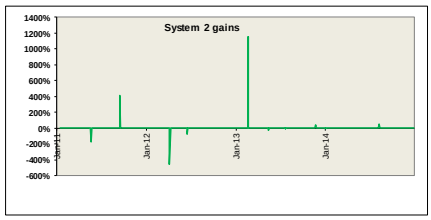


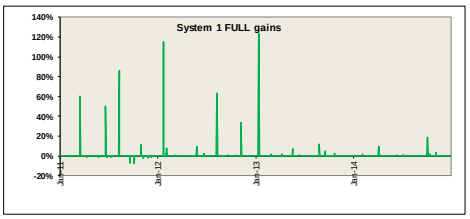


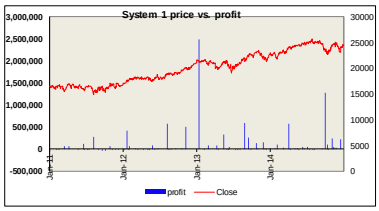


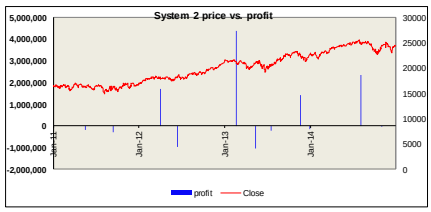


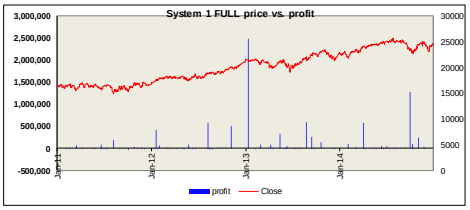




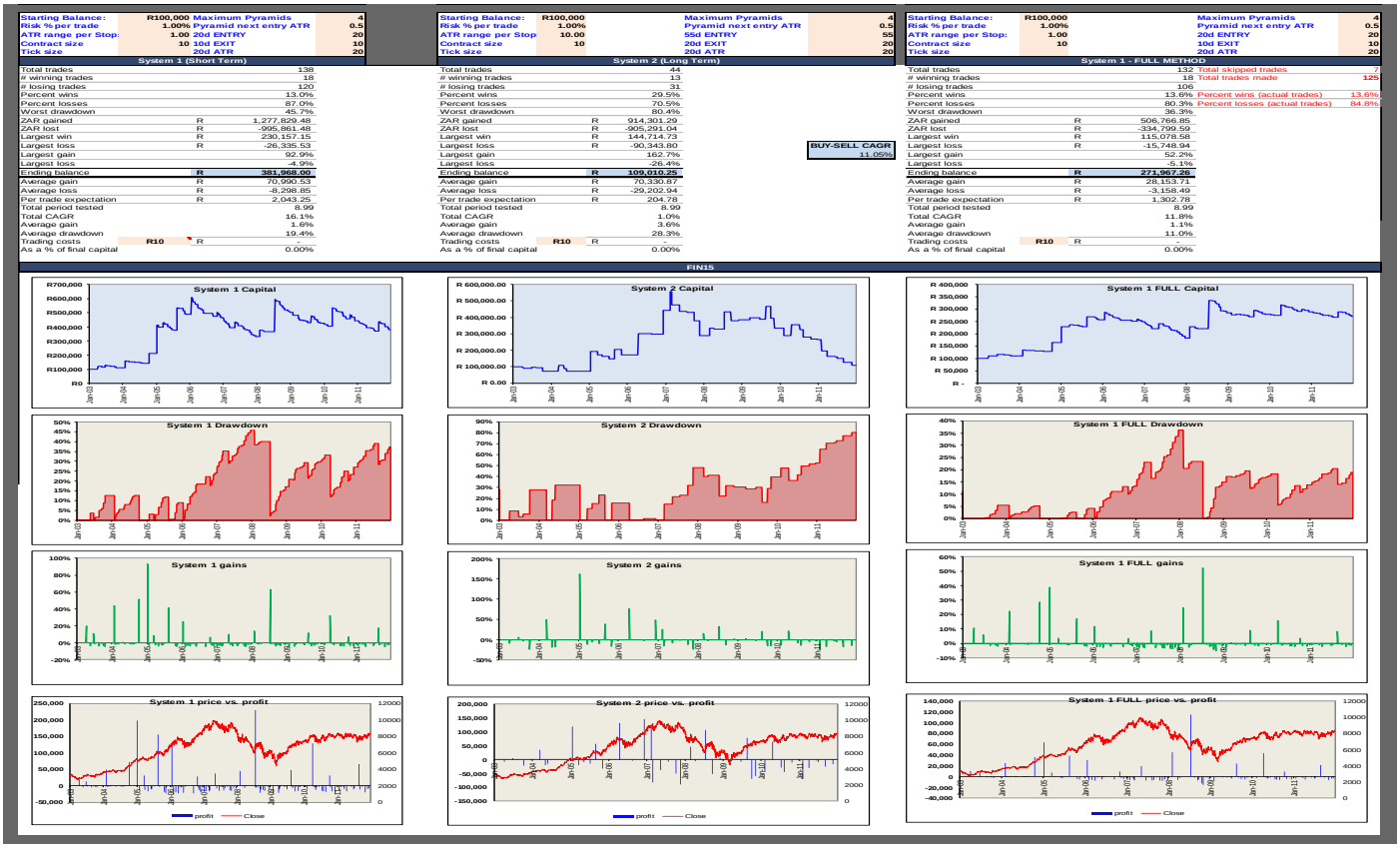




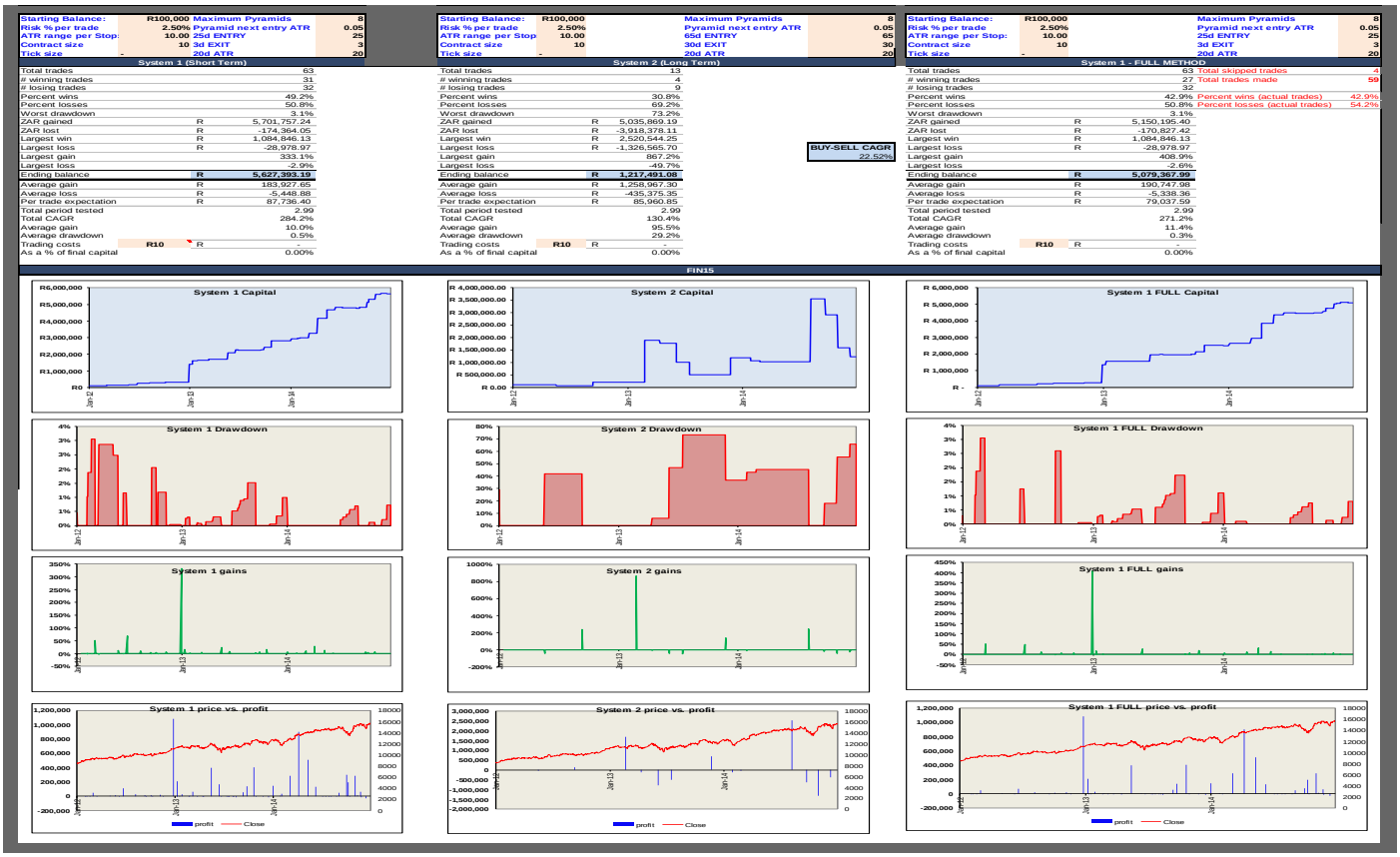




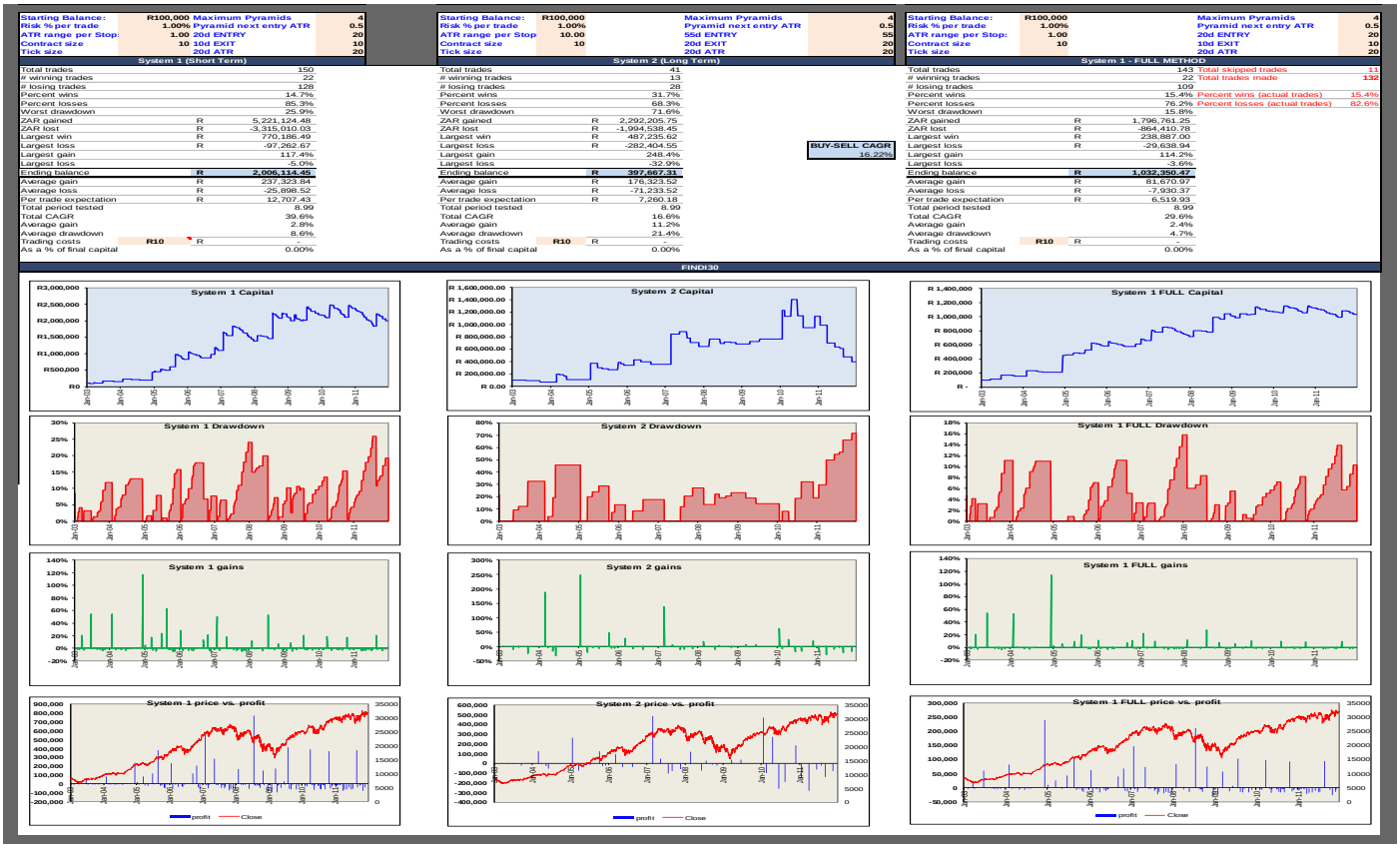
Initial backtesting results (initial period)



Out-of-sample results (2012-2014)



Initial backtesting results (initial period)



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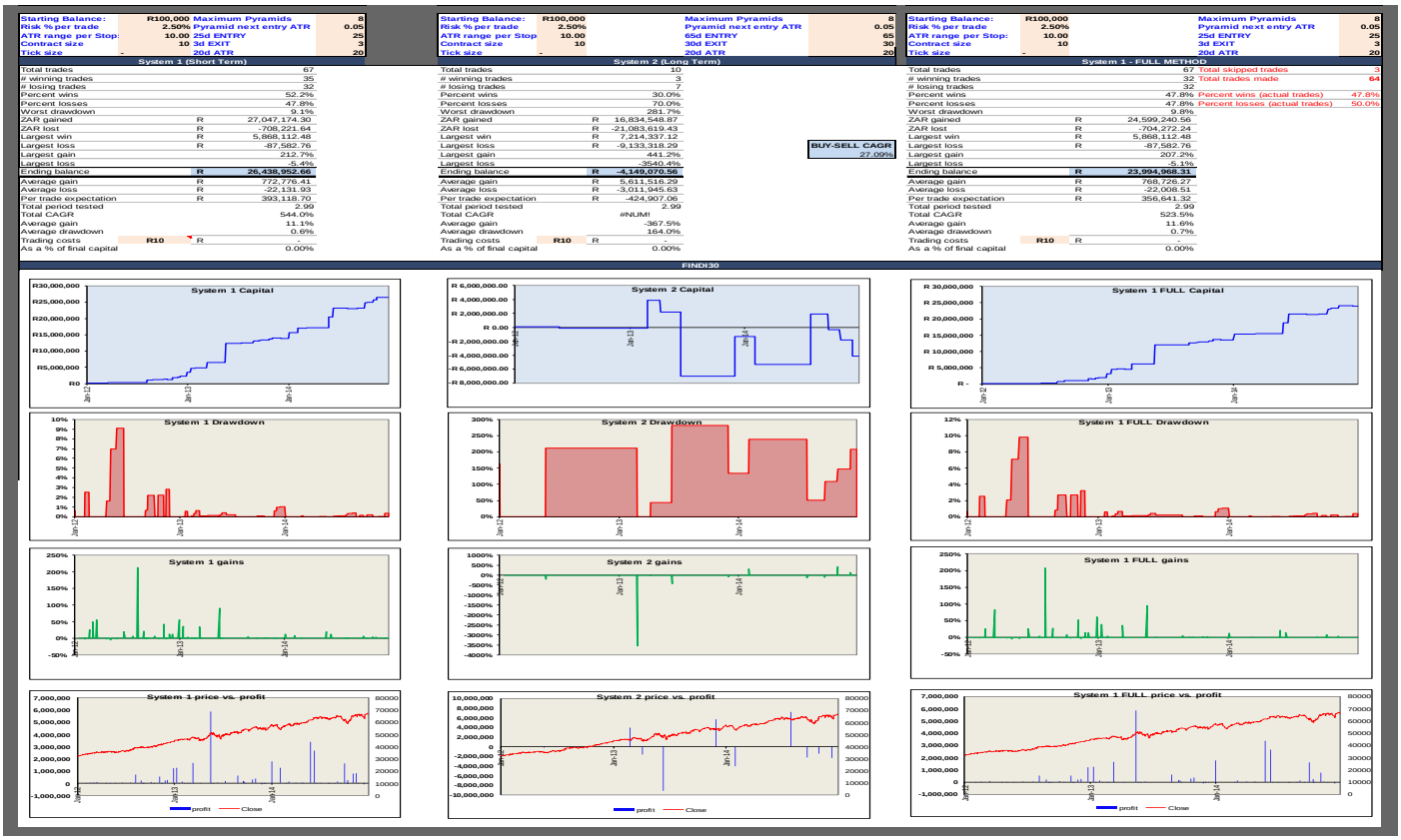

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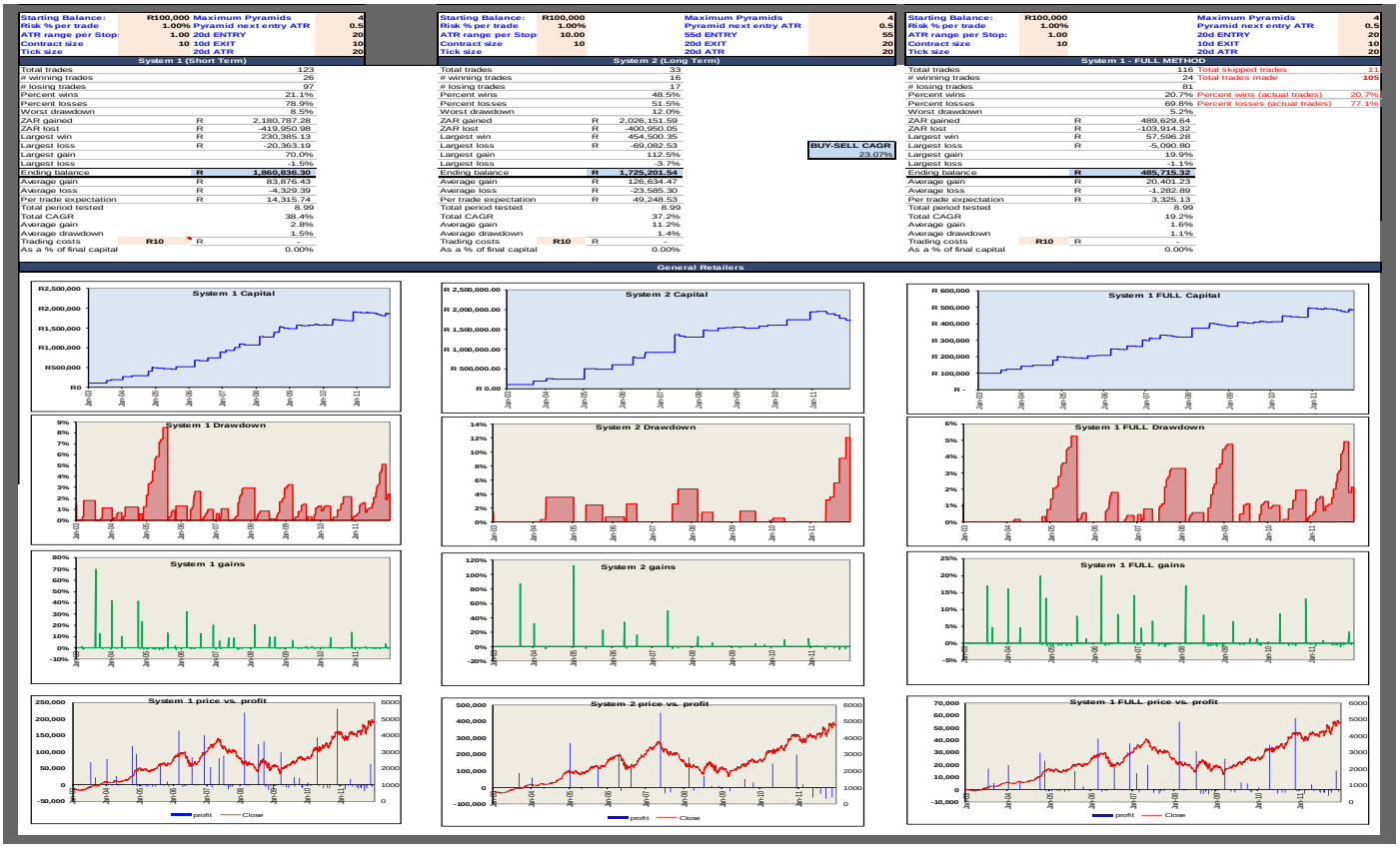

Out-of-sample results (2012-2014)

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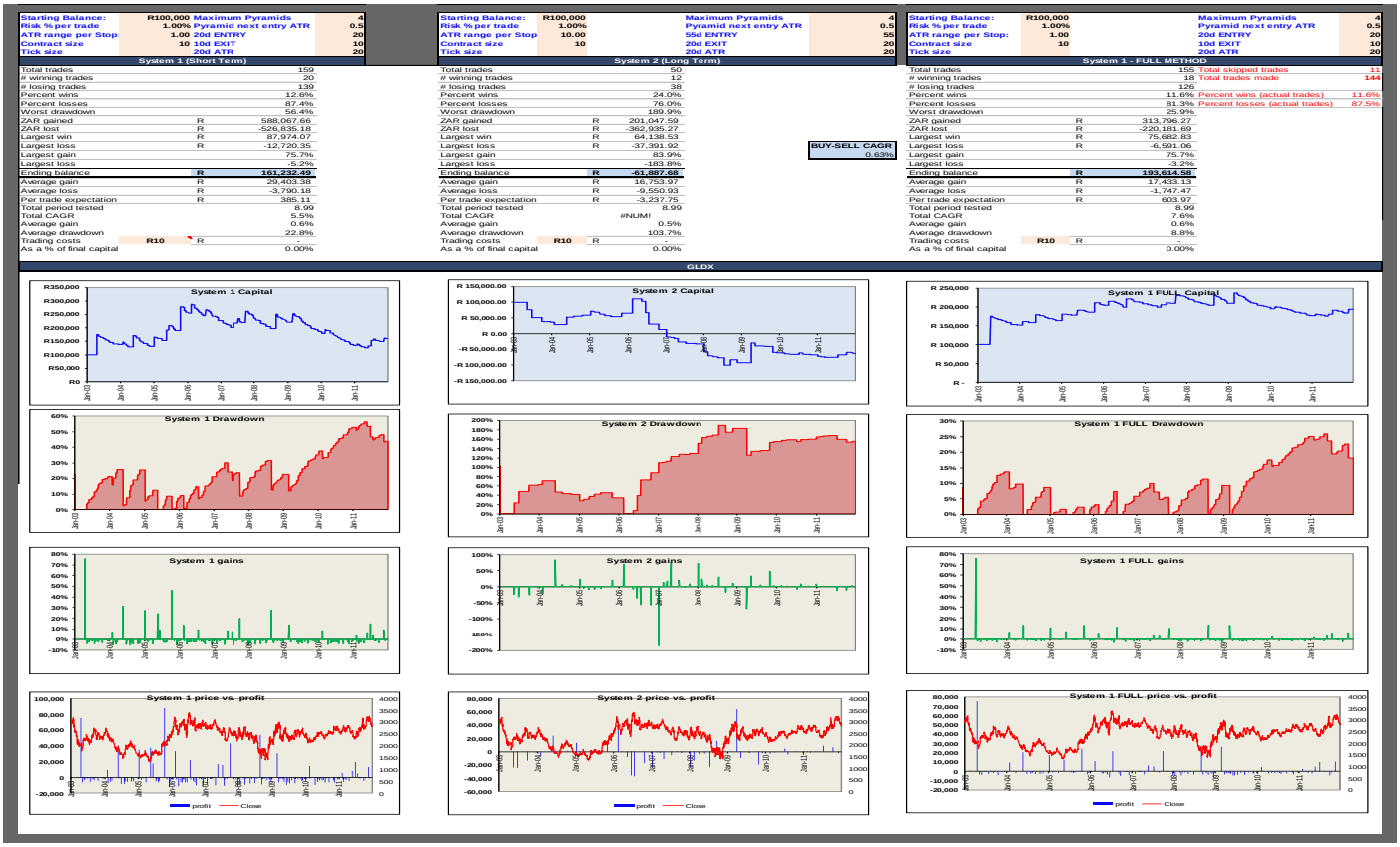
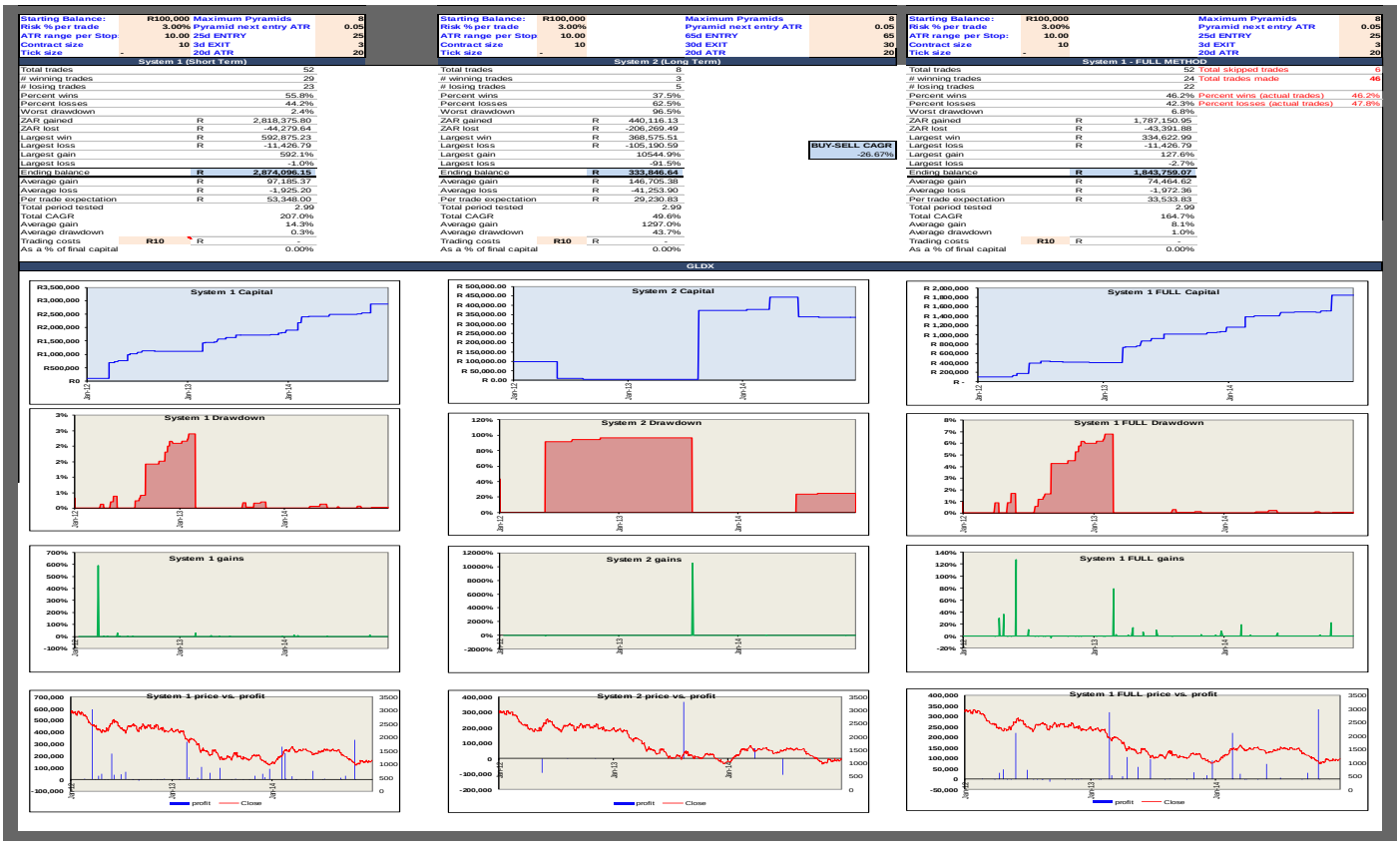


Out-of-sample results (2012-2014)



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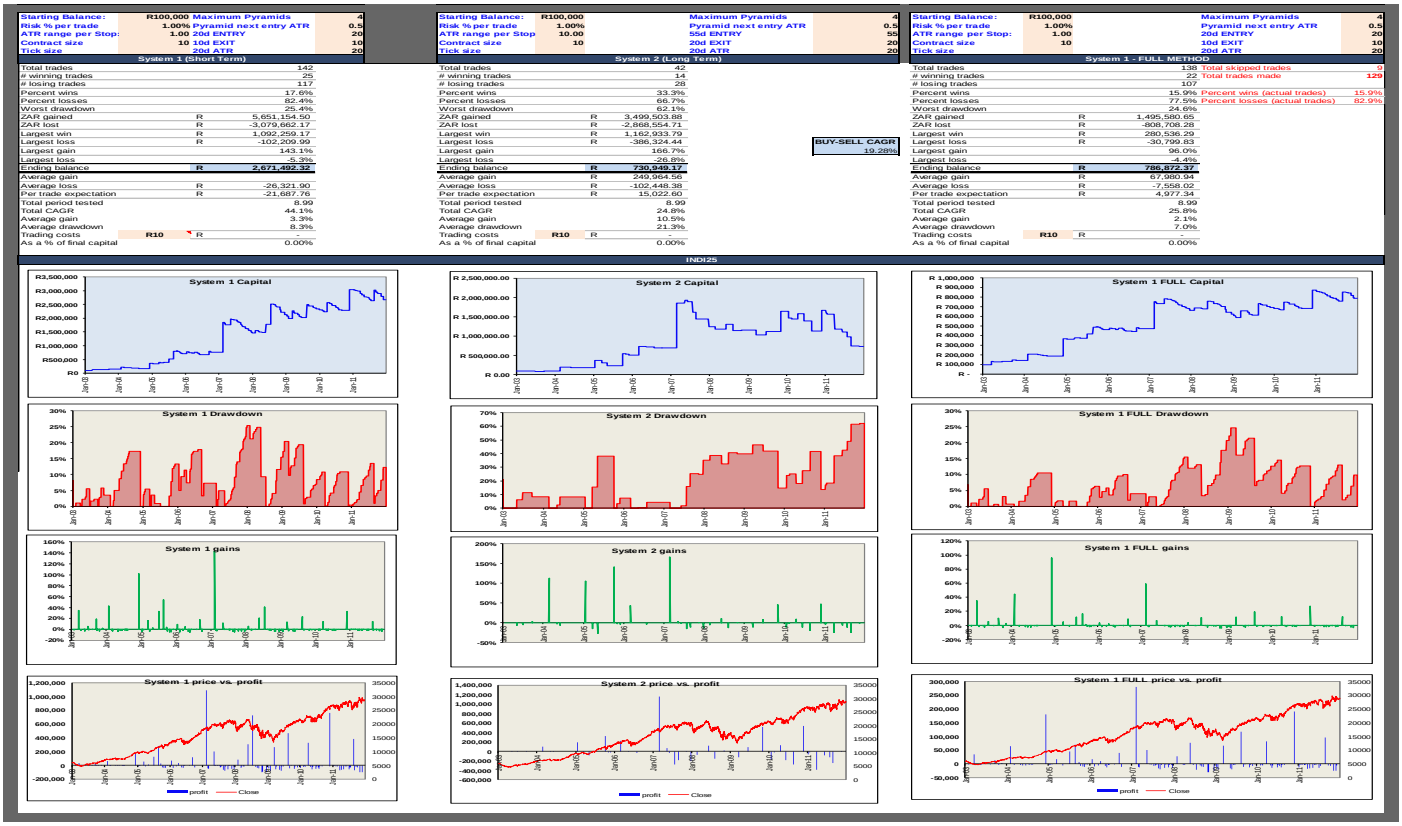
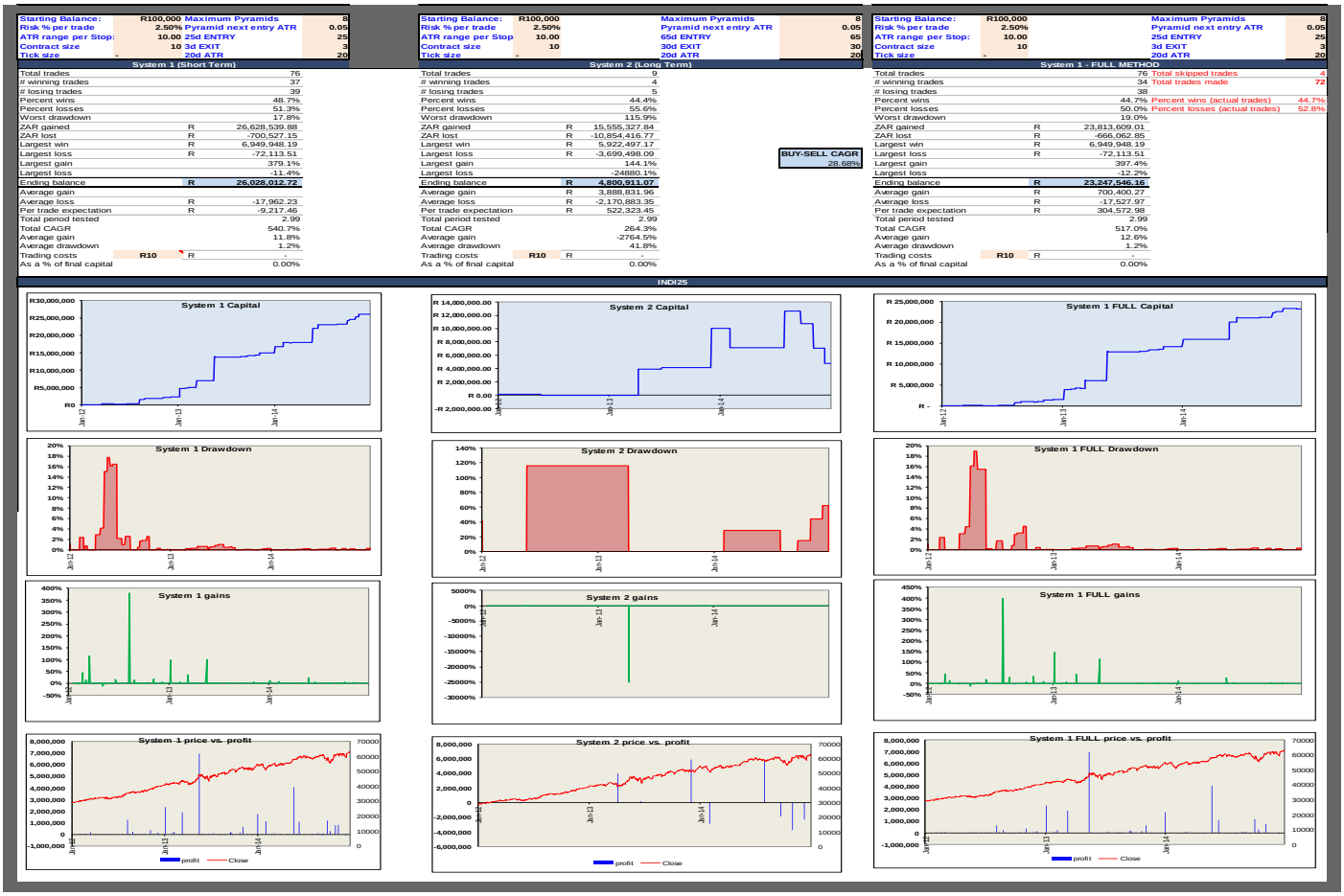


Out-of-sample results (2012-2014)



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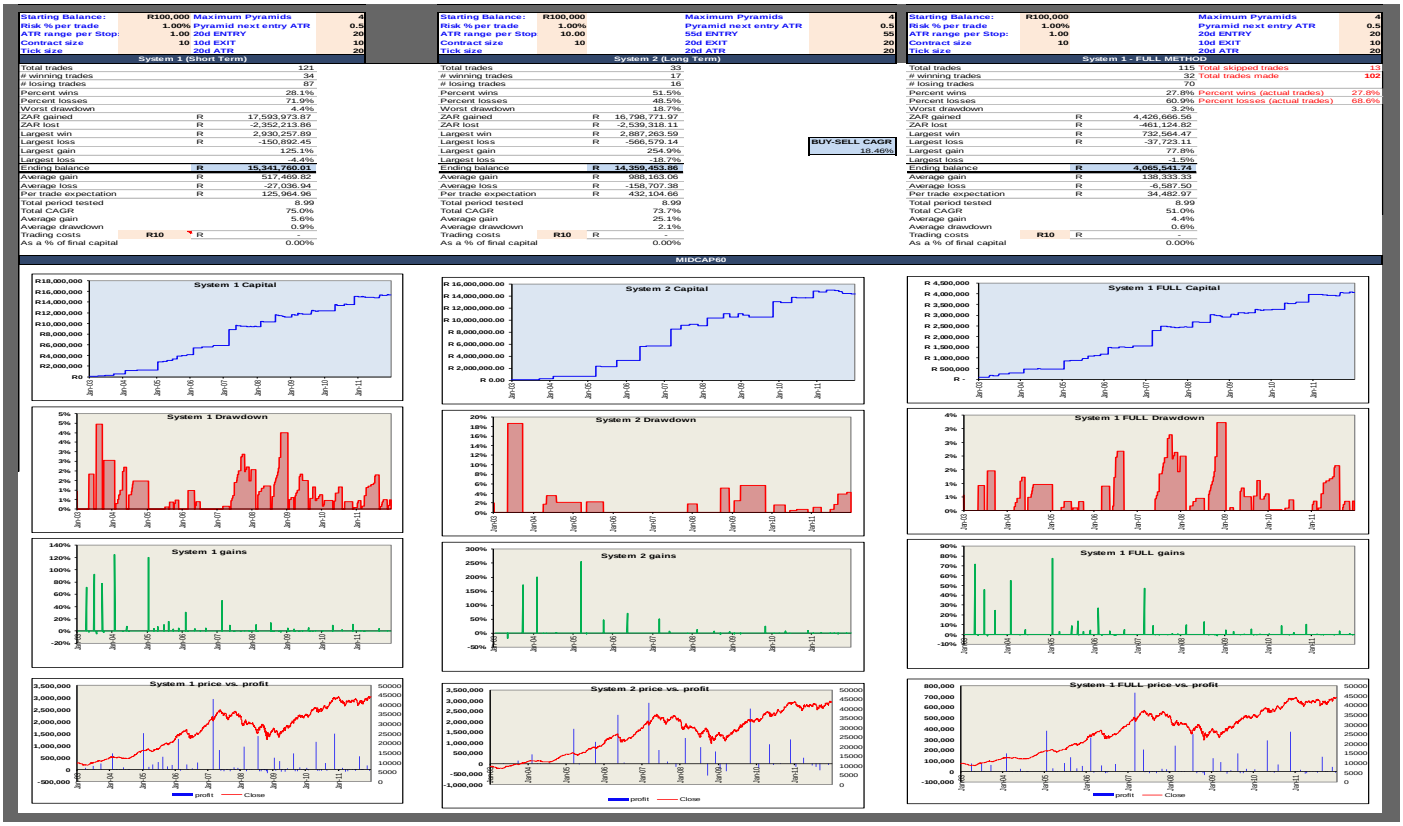

Out-of-sample results (2012-2014)

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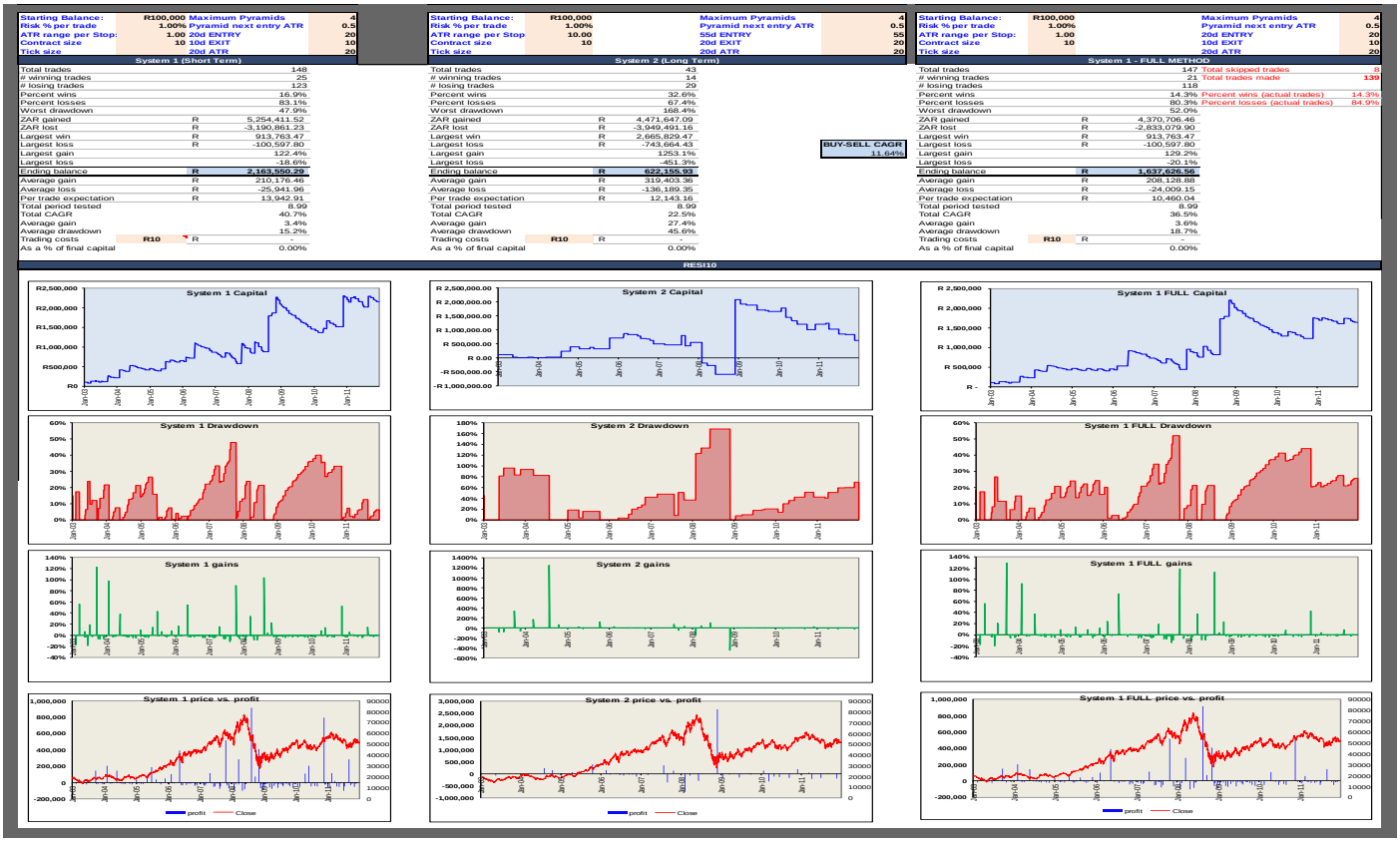

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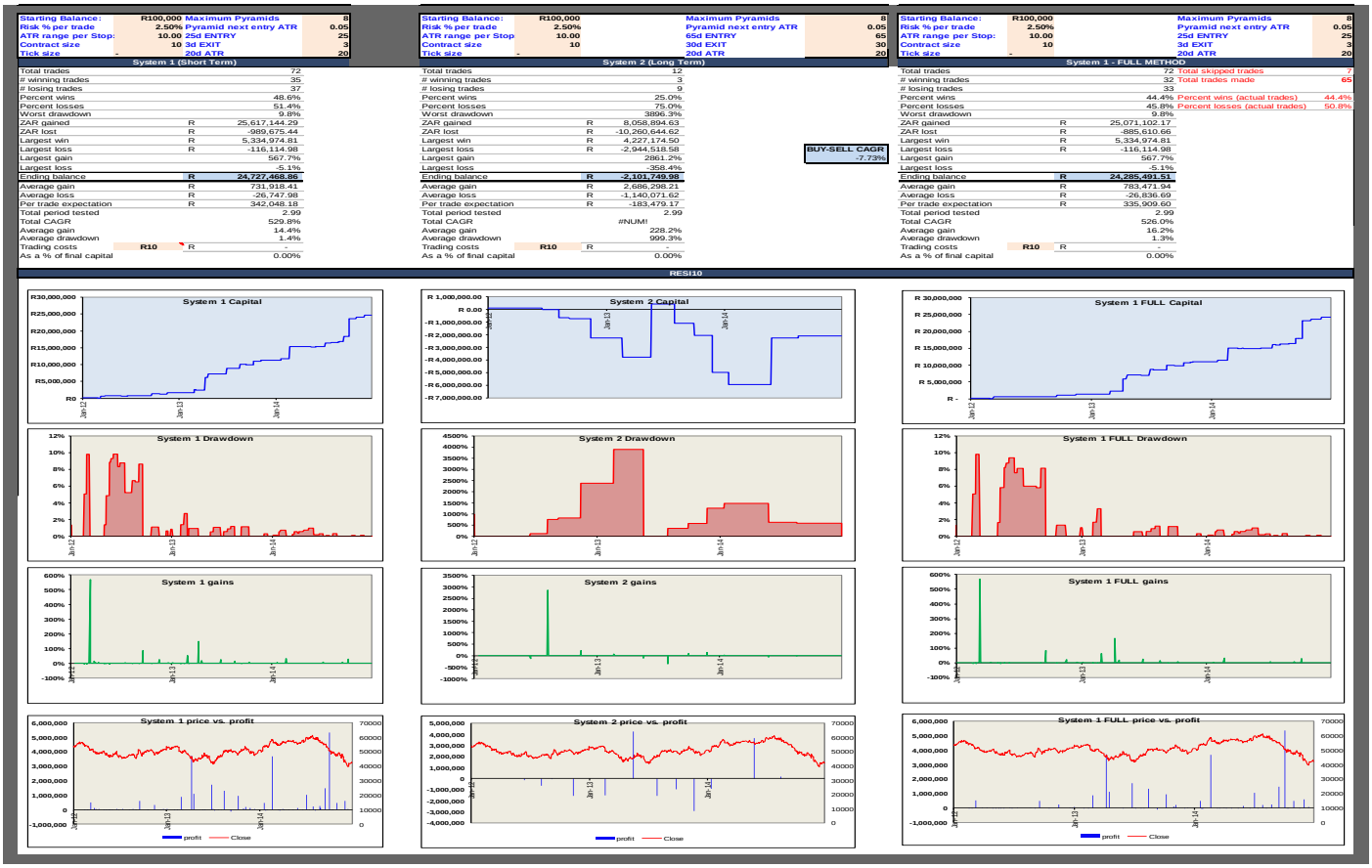

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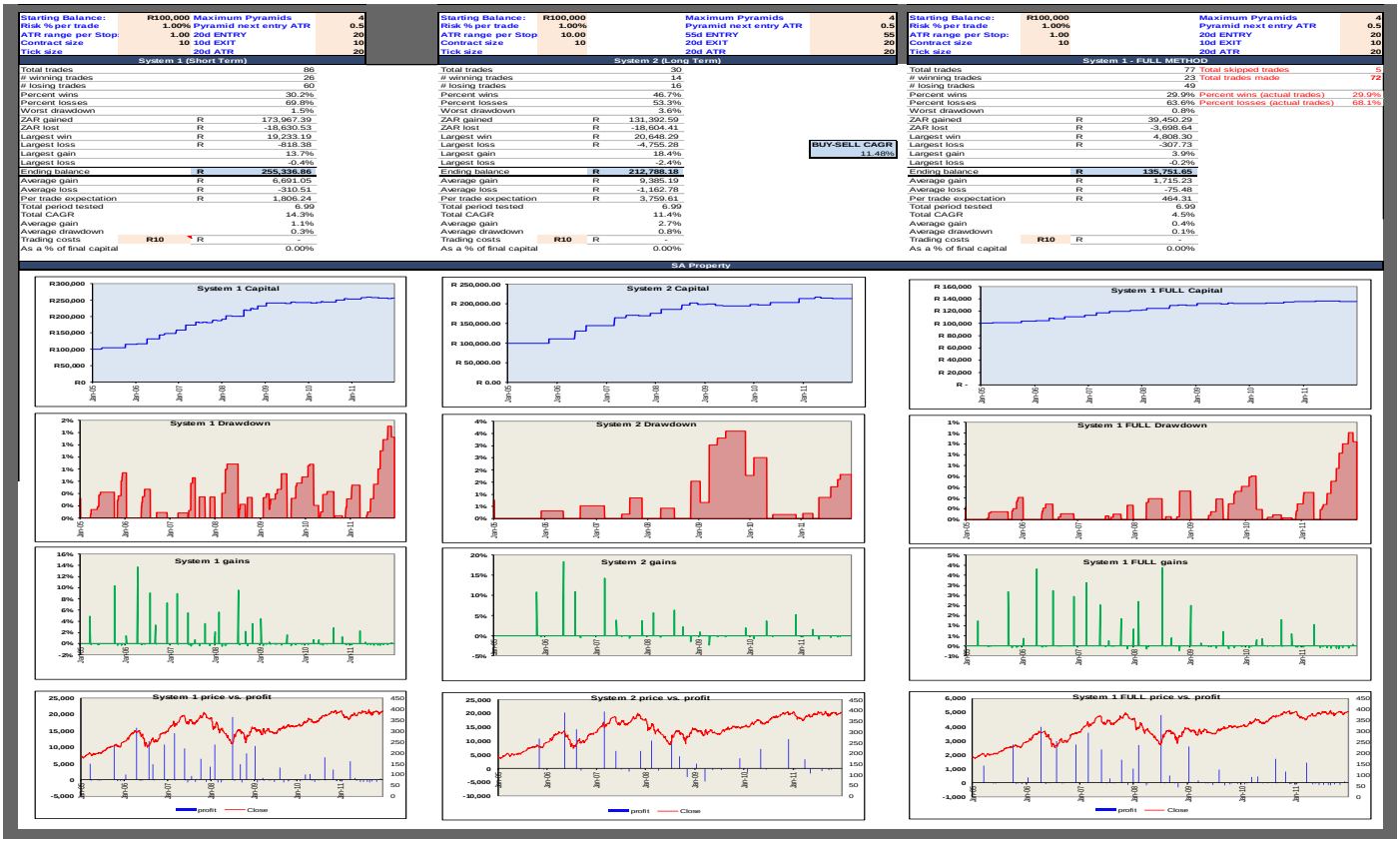

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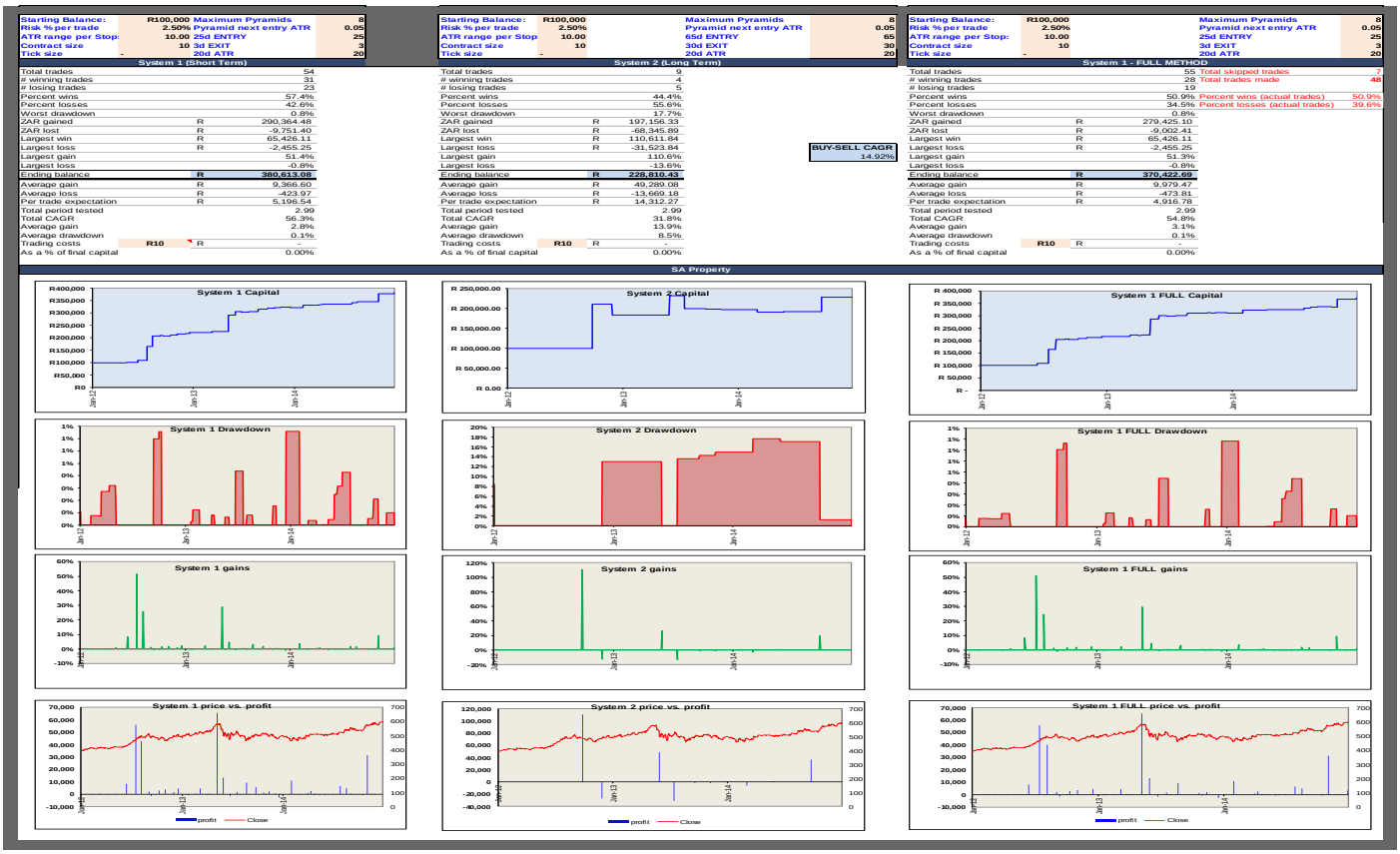
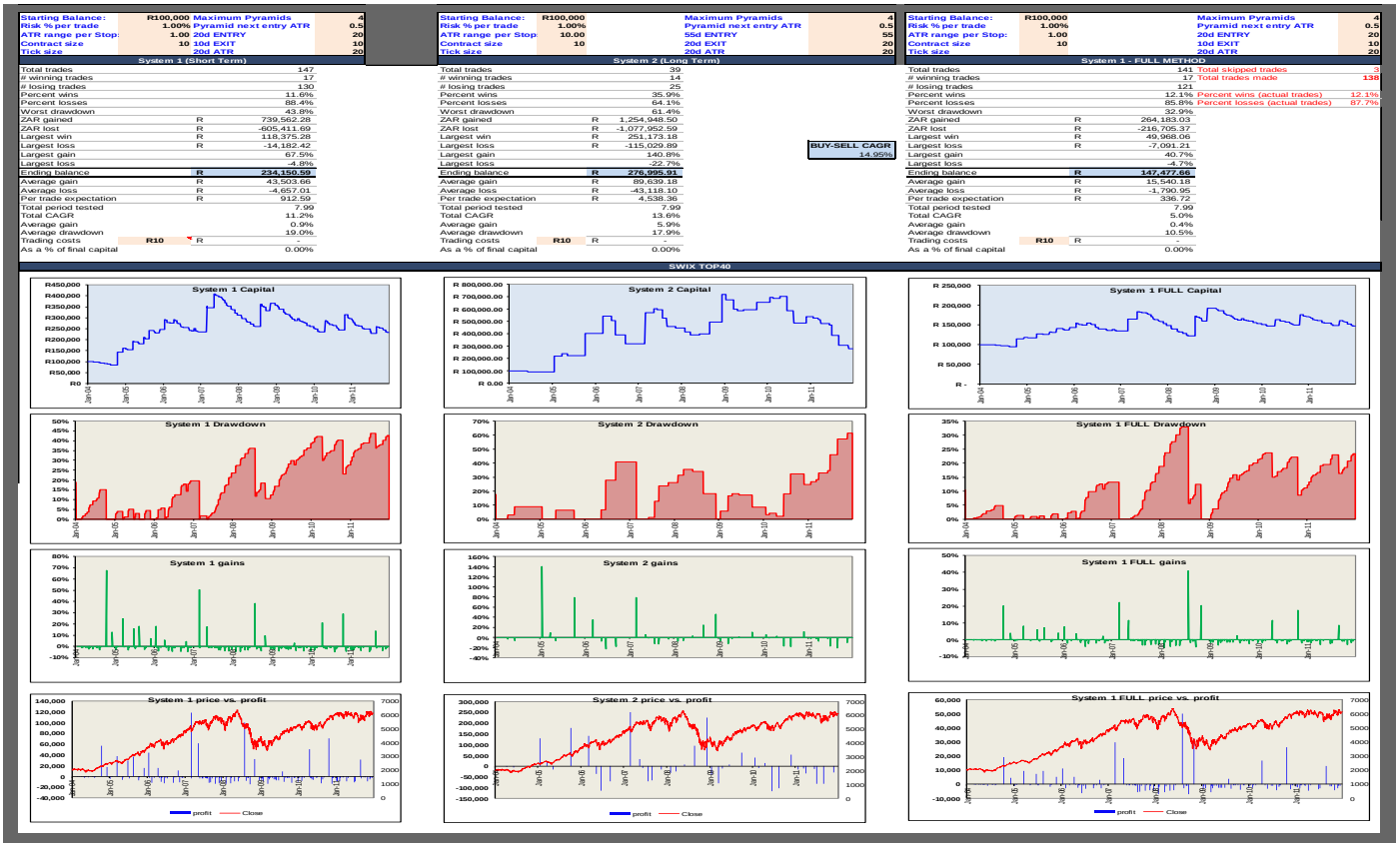


Initial backtesting results (initial period)



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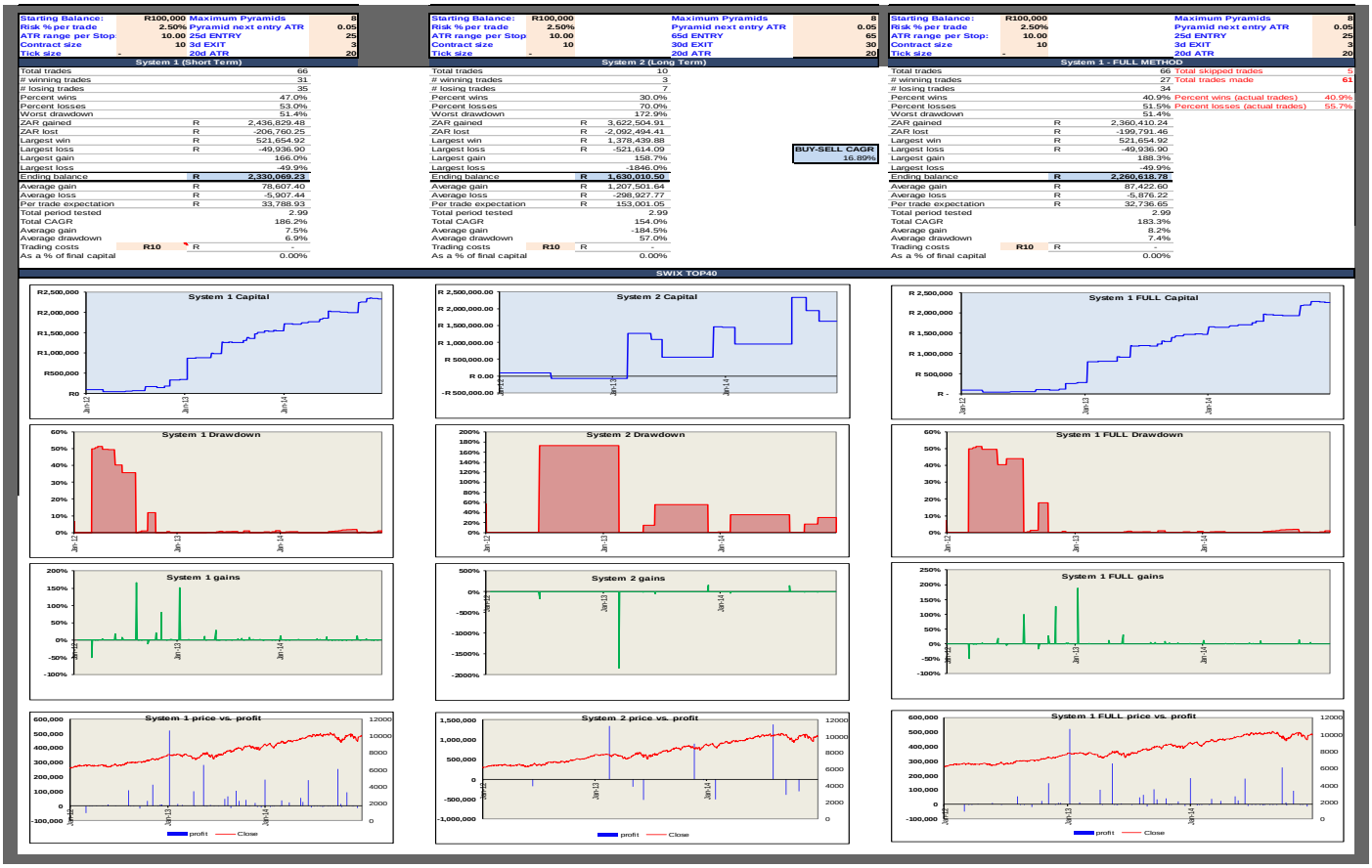
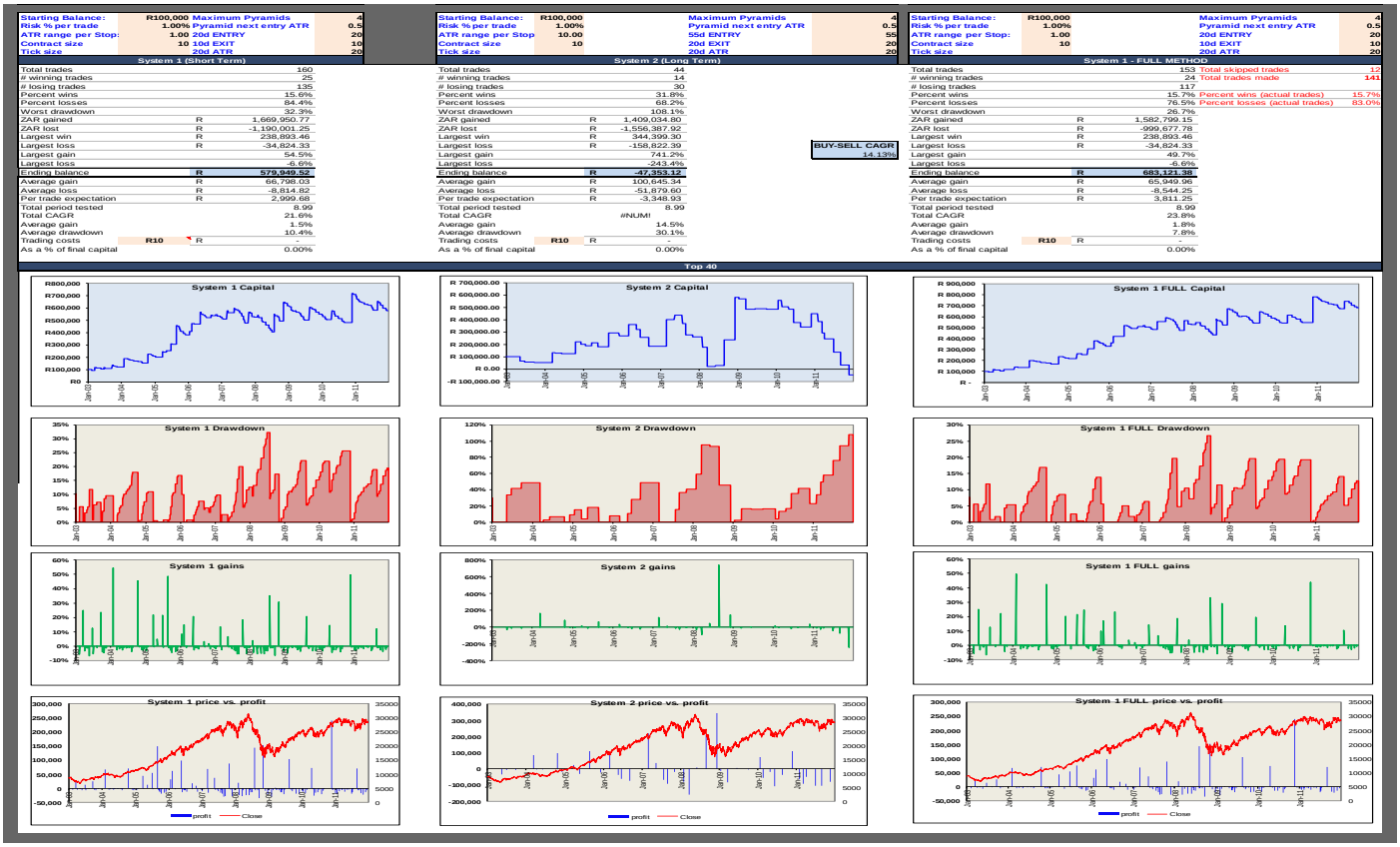


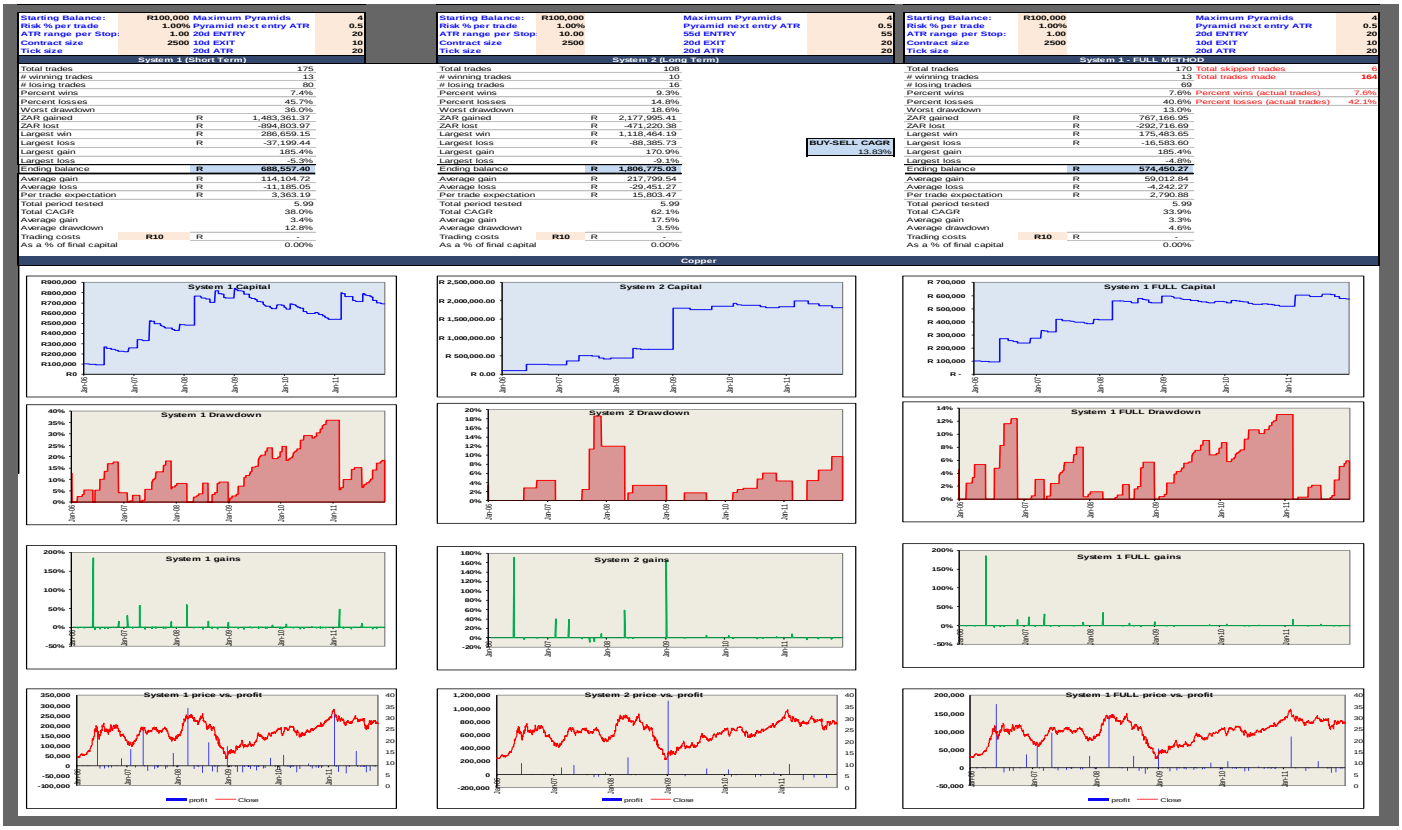
Initial backtesting results (initial period)



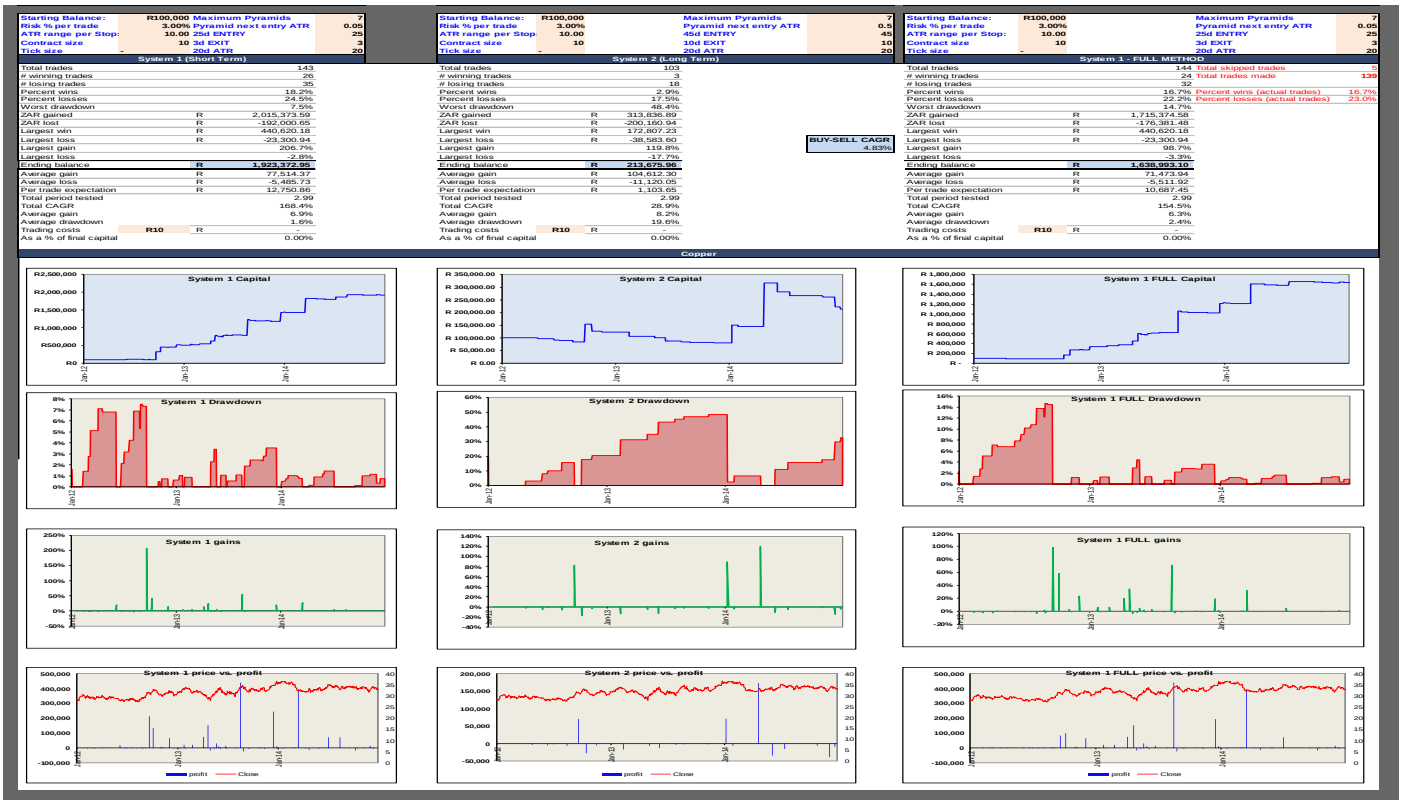
Out-of-sample results (2012-2014)

Precious Metals

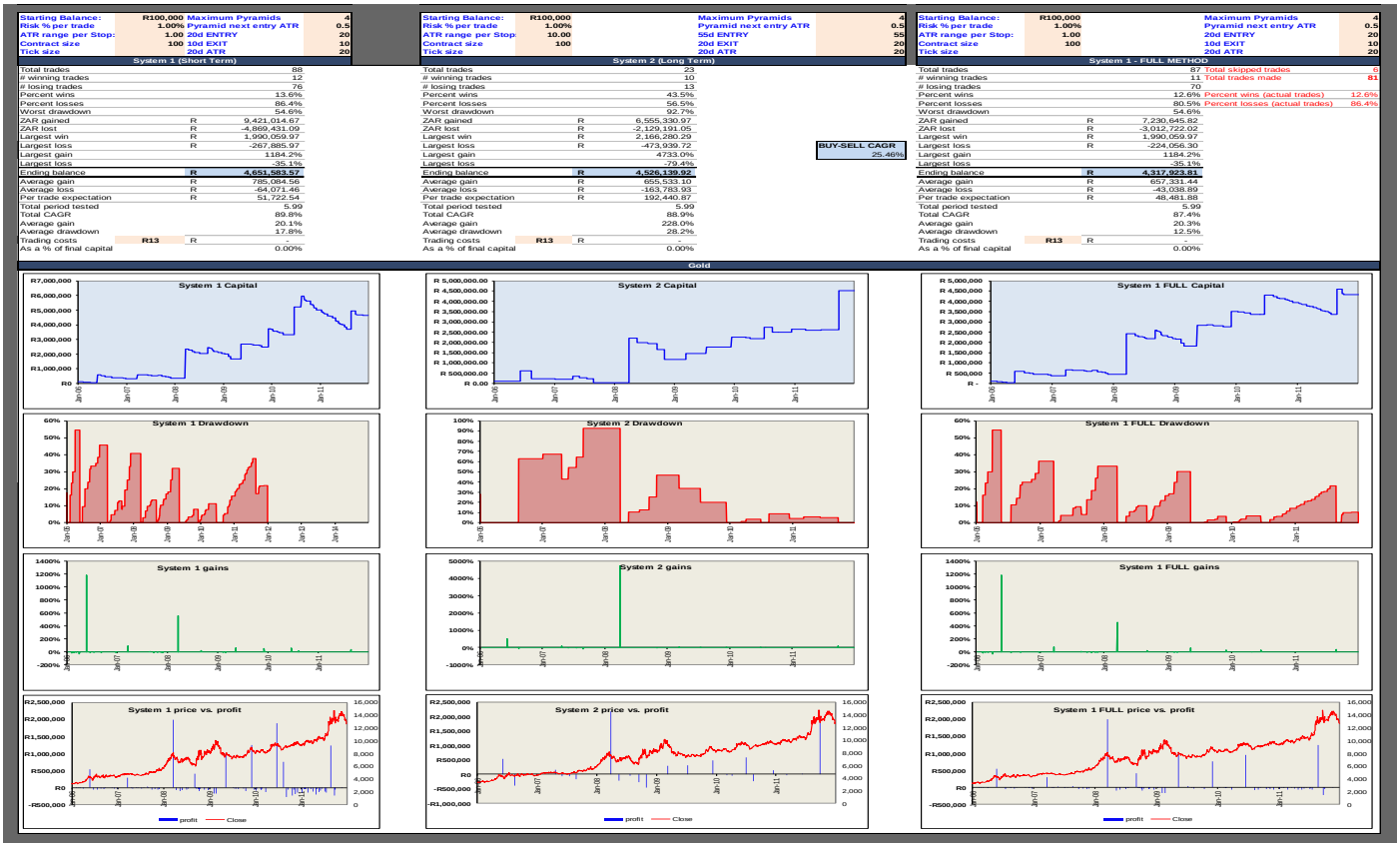
Initial backtesting results (initial period)



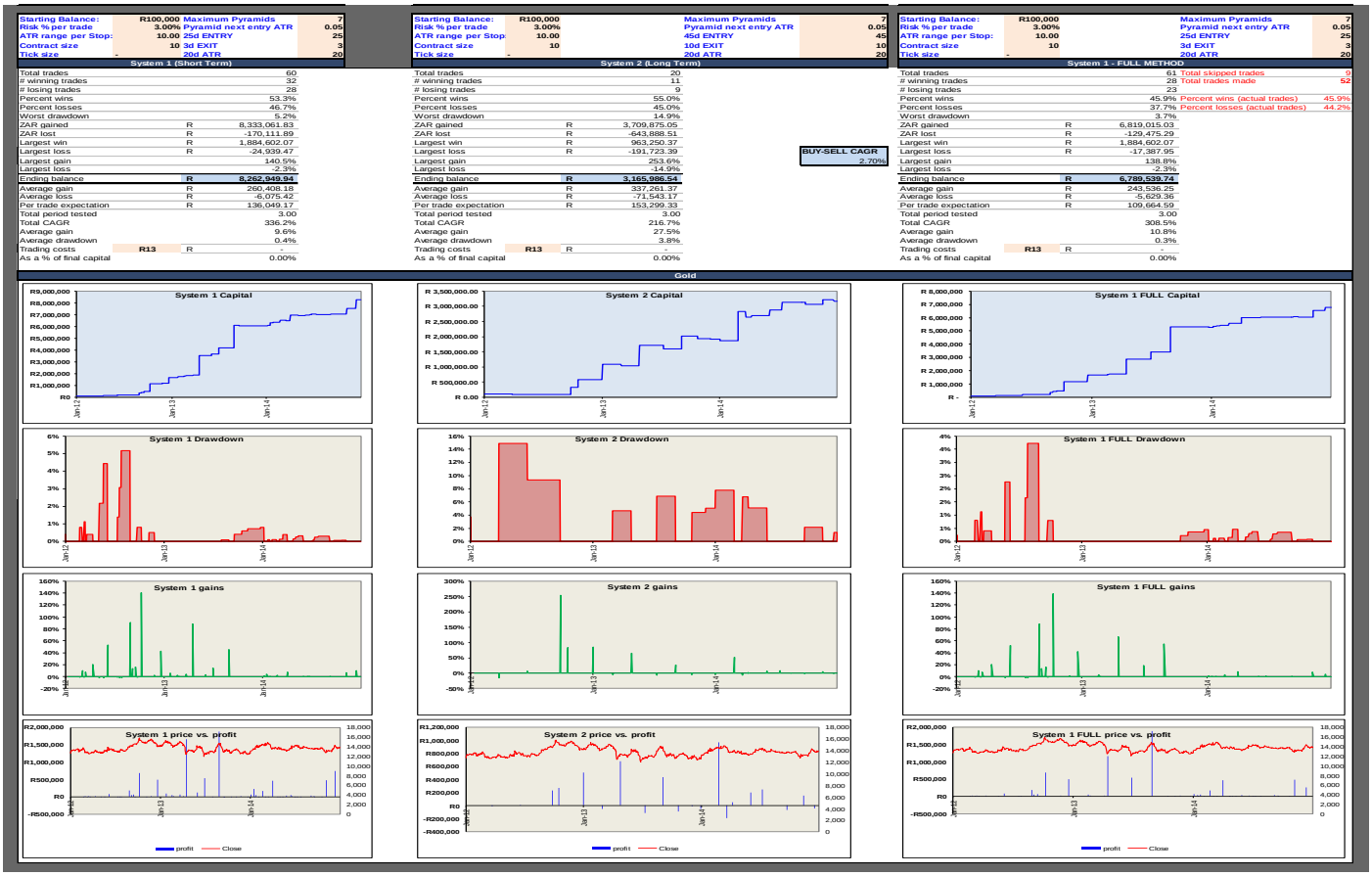
Out-of-sample results (2012-2014)



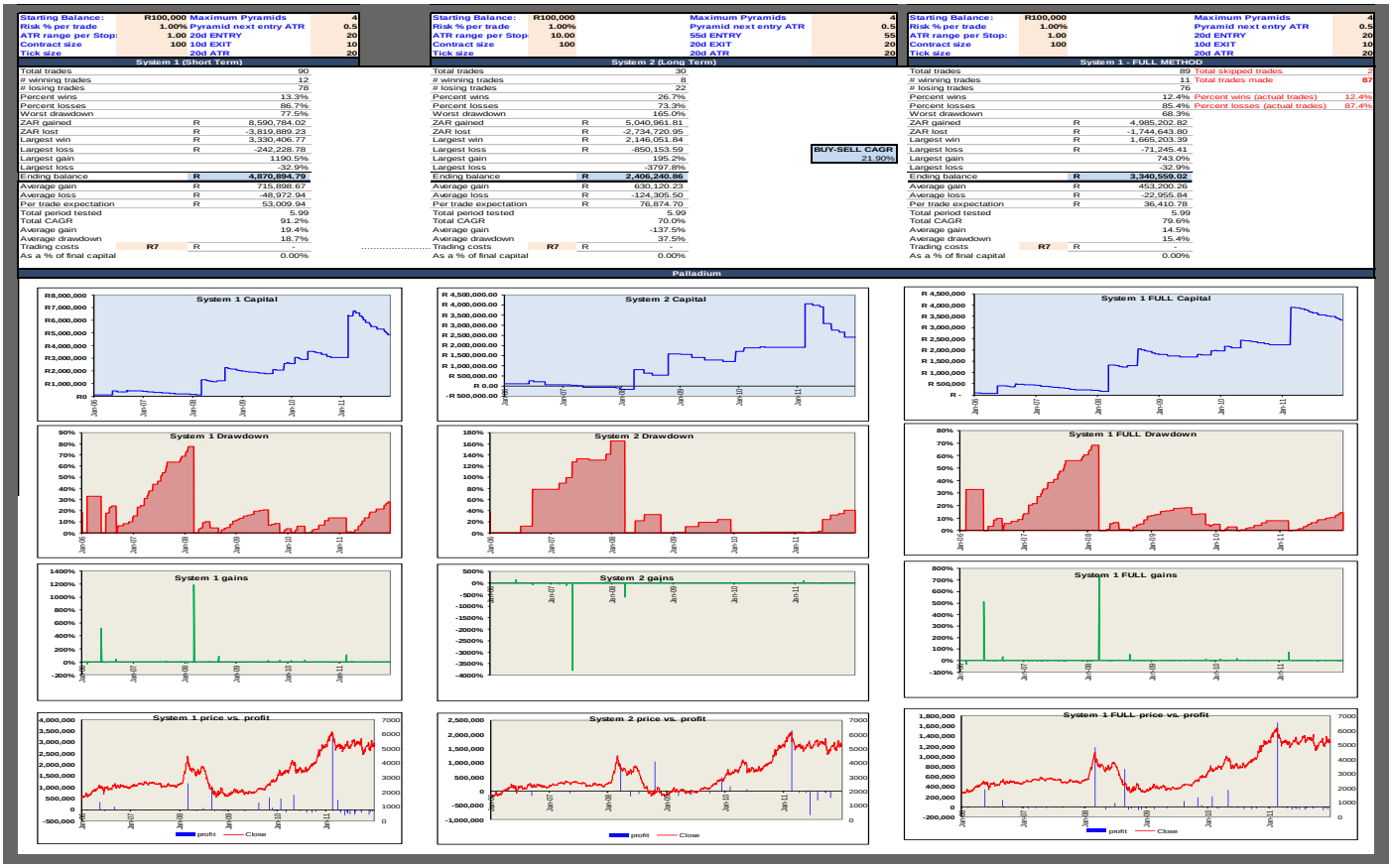
Initial backtesting results (initial period)



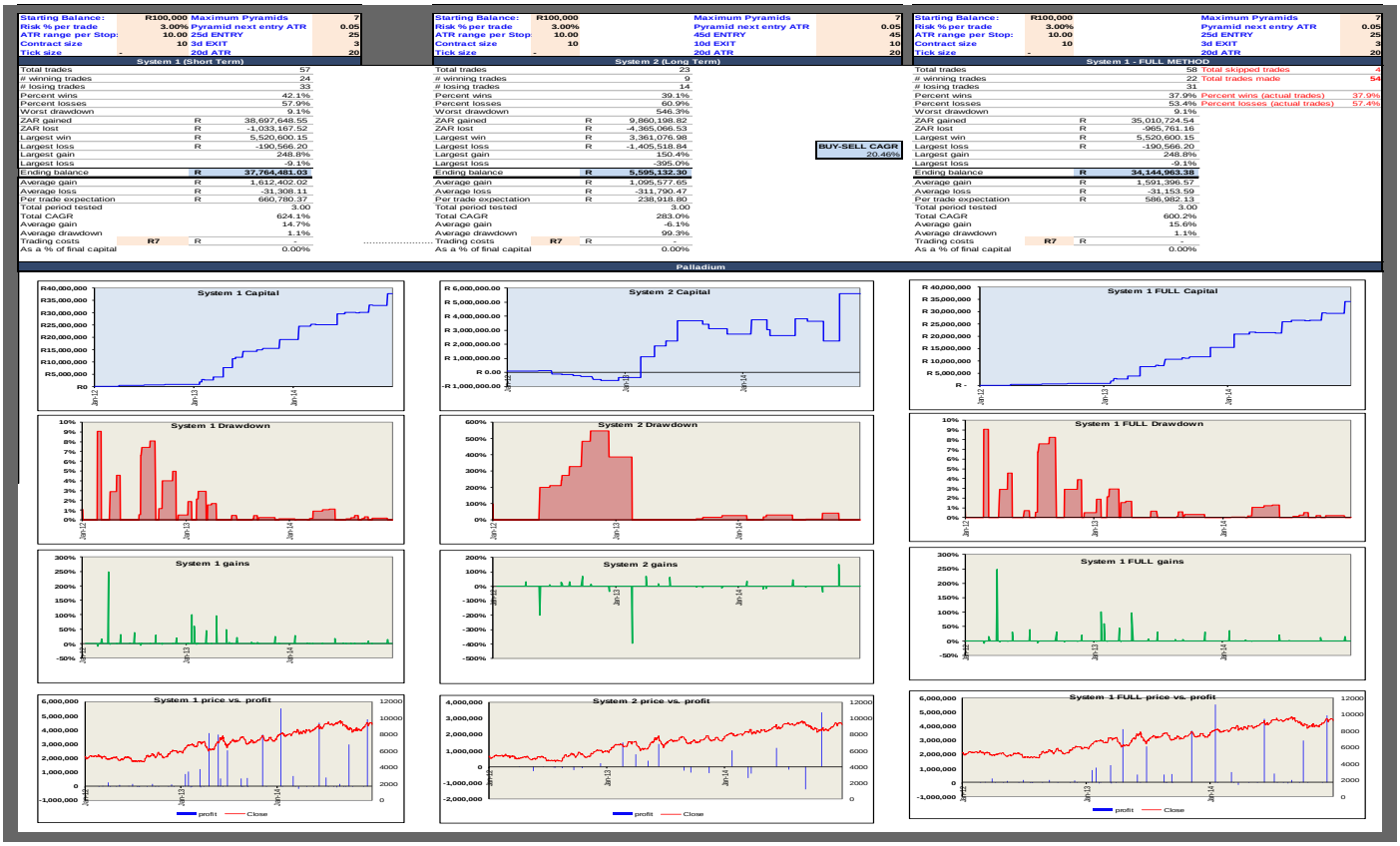
Out-of-sample results (2012-2014)



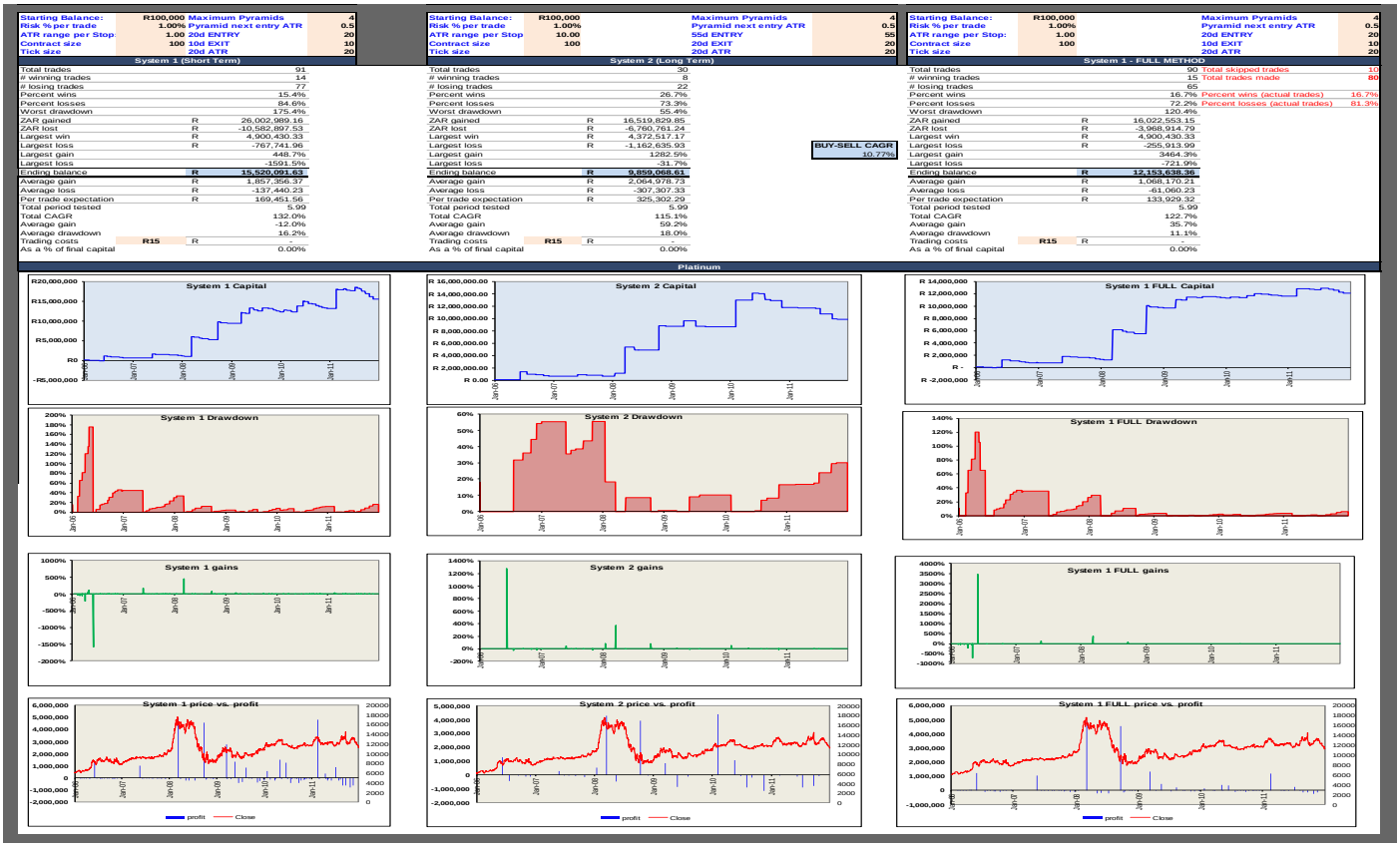
Initial backtesting results (initial period)



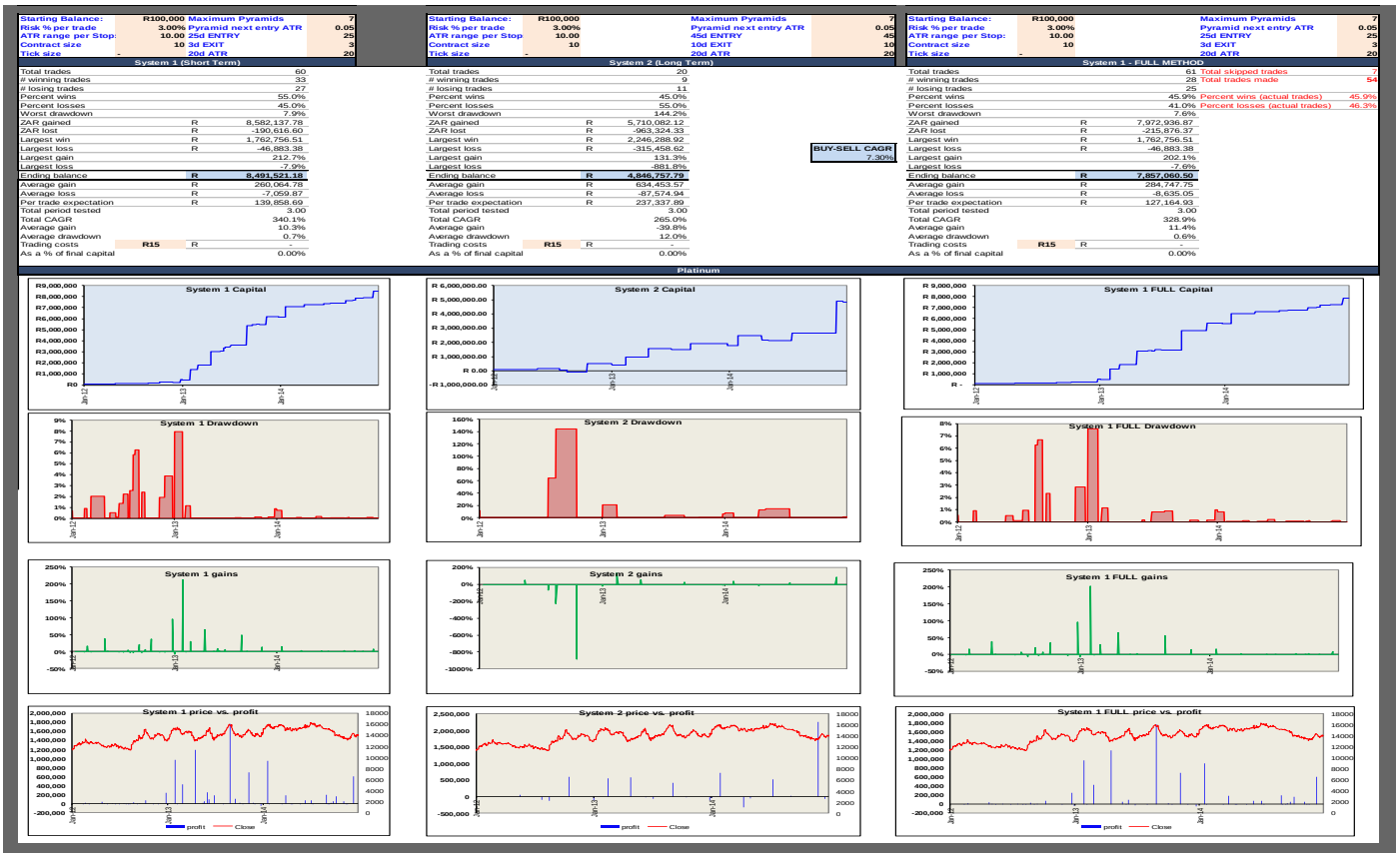
Out-of-sample results (2012-2014)



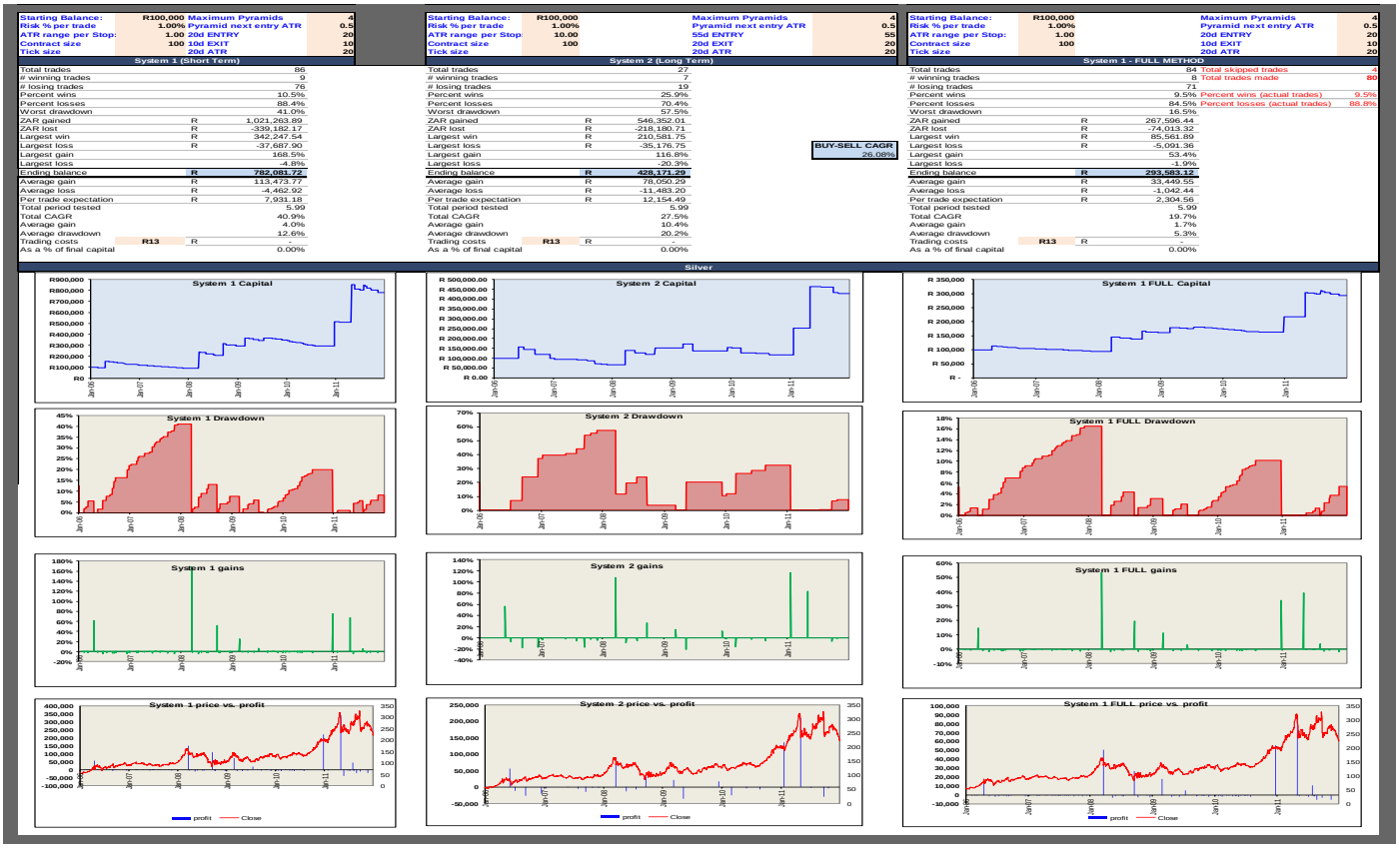
Initial backtesting results (initial period)



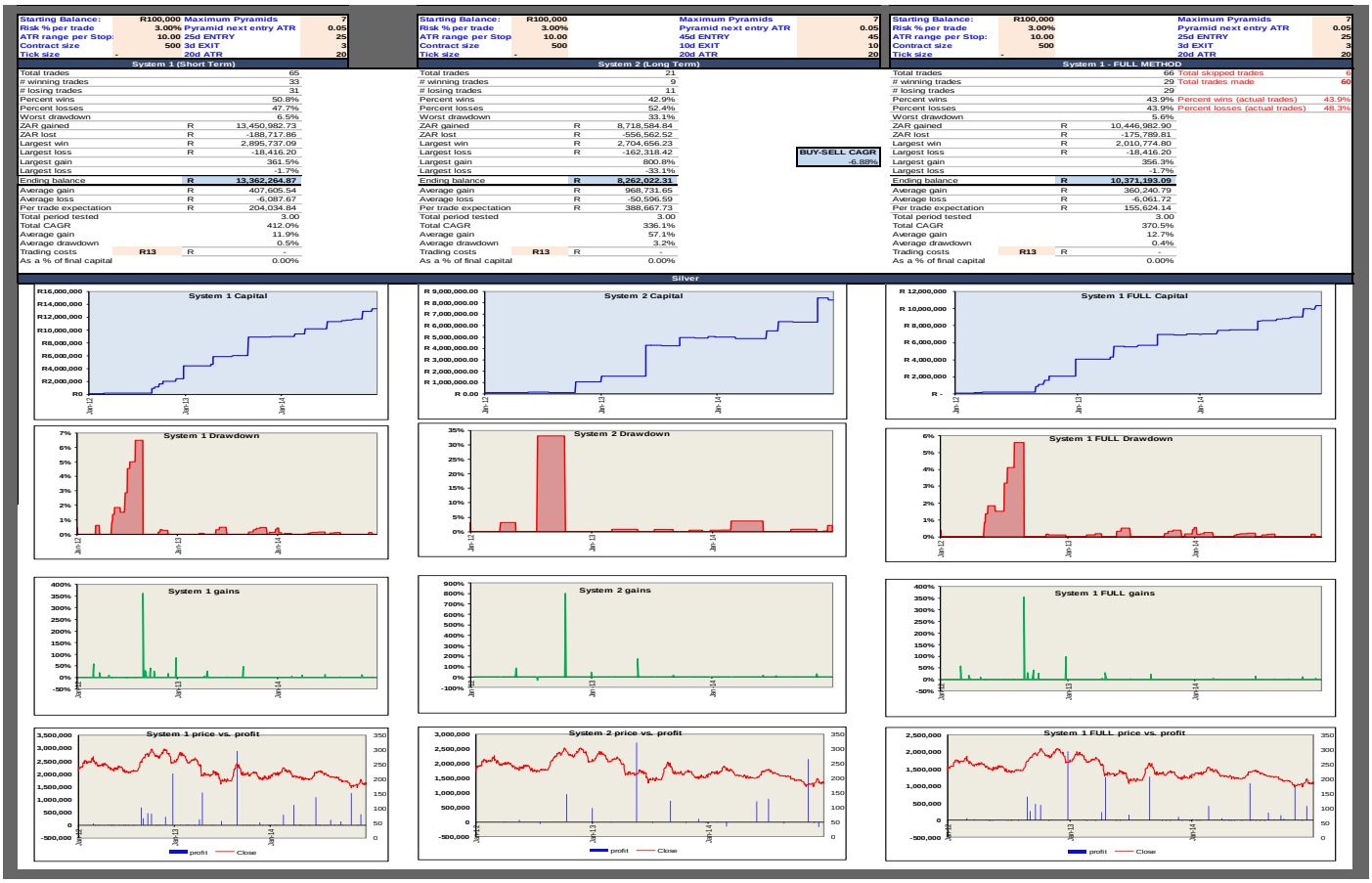
Out-of-sample results (2012-2014)



Initial backtesting results (initial period)



Out-of-sample results (2012-2014)



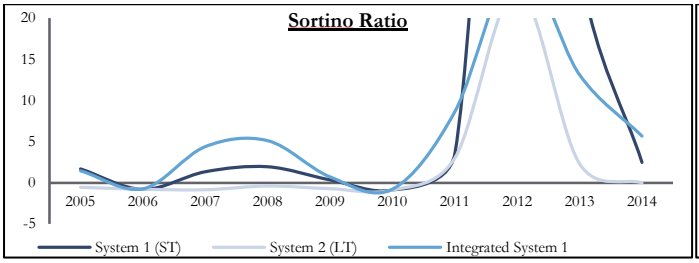
8.8. Historical evolution of the Sortino and Sharpe Ratio's across the trading models vs. rolling volatility

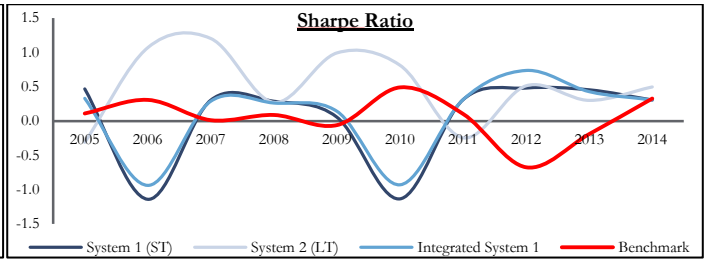
It must be noted that numerous immaterial results were produced in the Sortino Ratio calculations. This arose largely due to the comparative year's buy-and-hold benchmark of the underlying instrument being used, which yielded a negative benchmark at times. This meant that some years had no negative excess returns, thereby no downside risk leading to immeasurable outperformance of the benchmark. Other times the strategies simply outperformed the benchmark and also resulted in no or insignificant downside variation, thereby leading to immaterial Sortino values. These have been noted alongside the respective instruments and must be considered when analysing the historical evolution of this parametric. (i.e. while some years may have a flat or 0 value curve where one can infer an underperforming metric, the annotations must be consulted to confirm if this is true).

The results are collated on the following page:

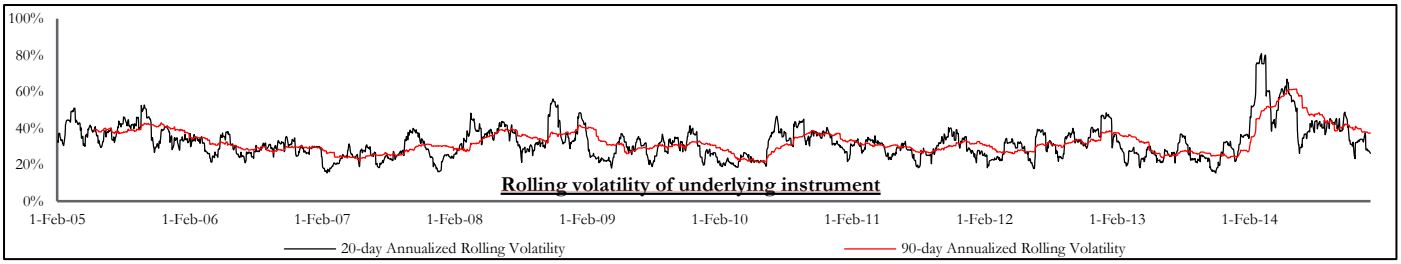
Agriculture

Coffee

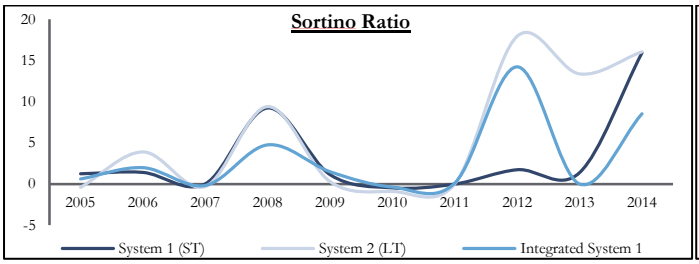


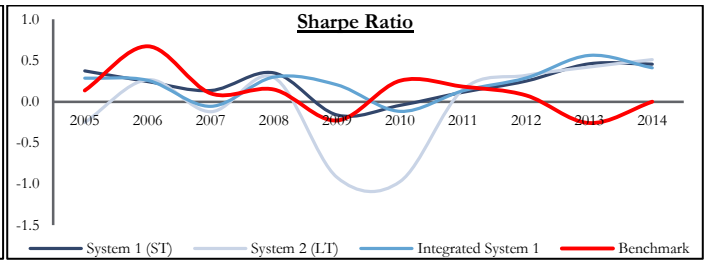


* 2009 & 2014 (S2) generated immaterial values. 2012 (all systems) generated significant outlying data points

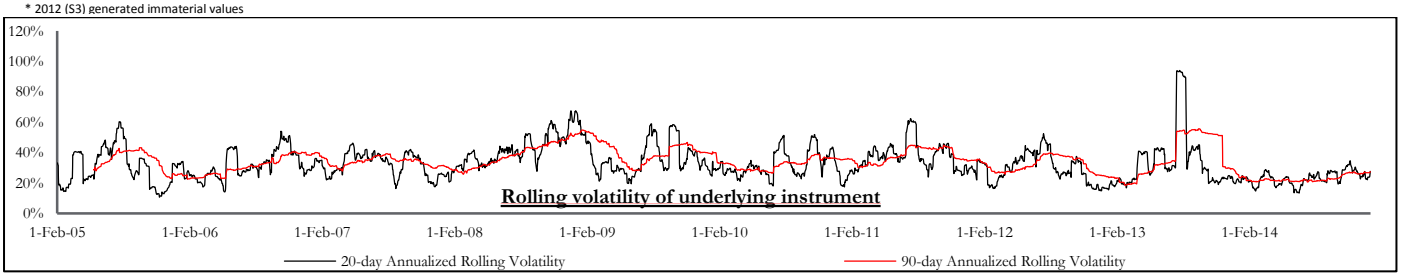


Corn

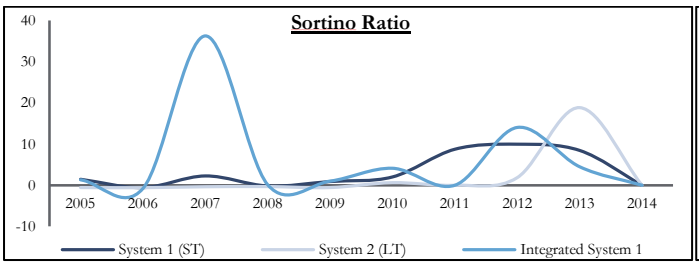


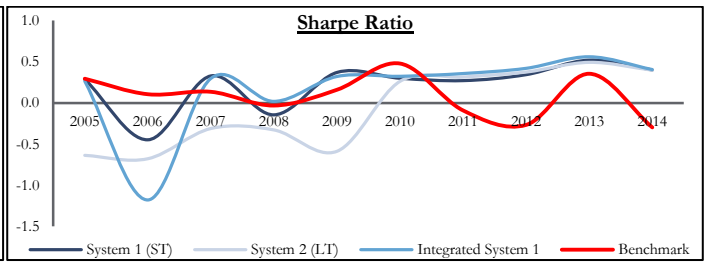


* 2012 (S3) generated immaterial values

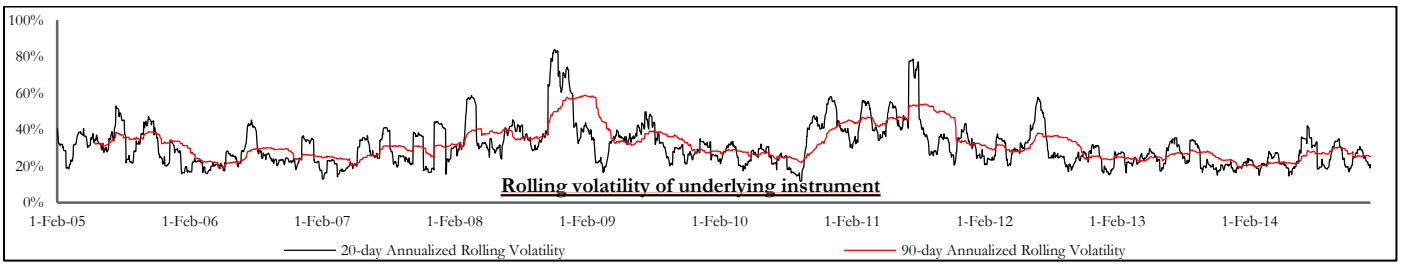


Cotton

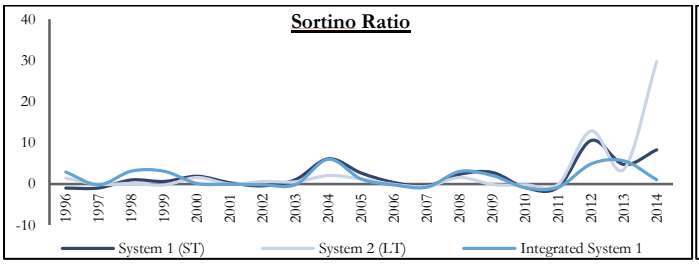


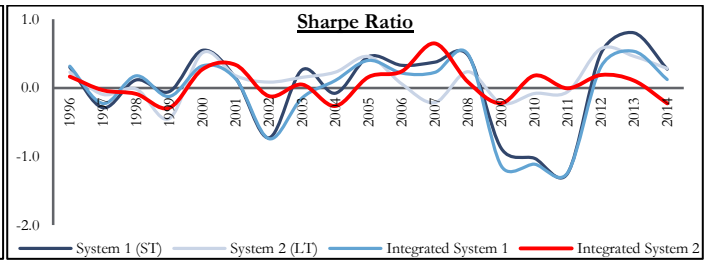


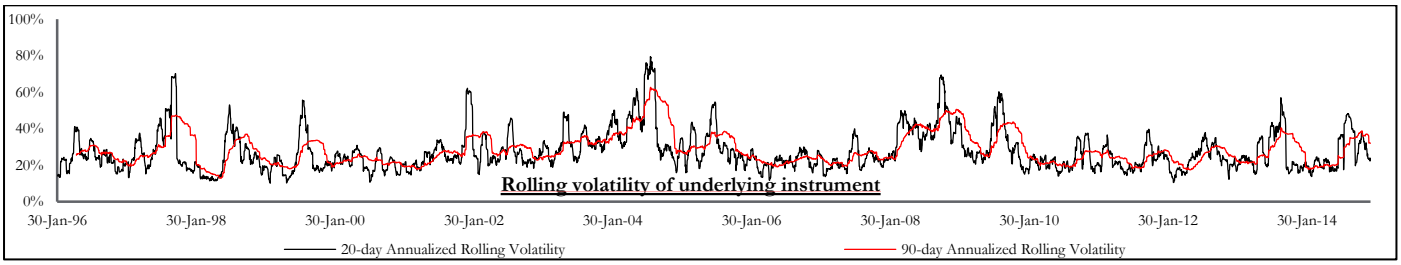
*2011 – System 2 had an outlying value of 149.11 excluded from the graph. The integrated system had no negative excess returns yielding an immaterial calculation. 2014 all systems produced immaterial



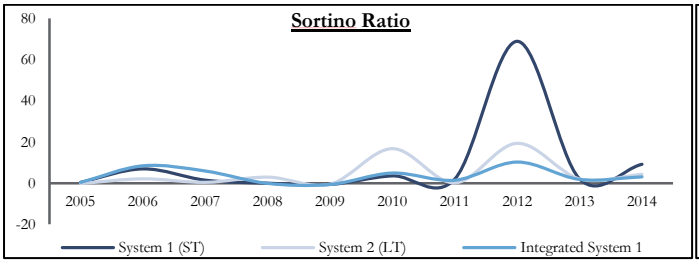
Soybean

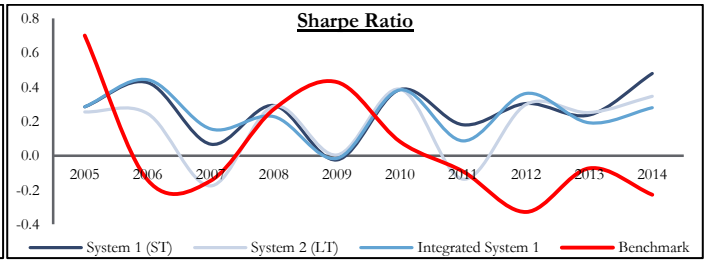


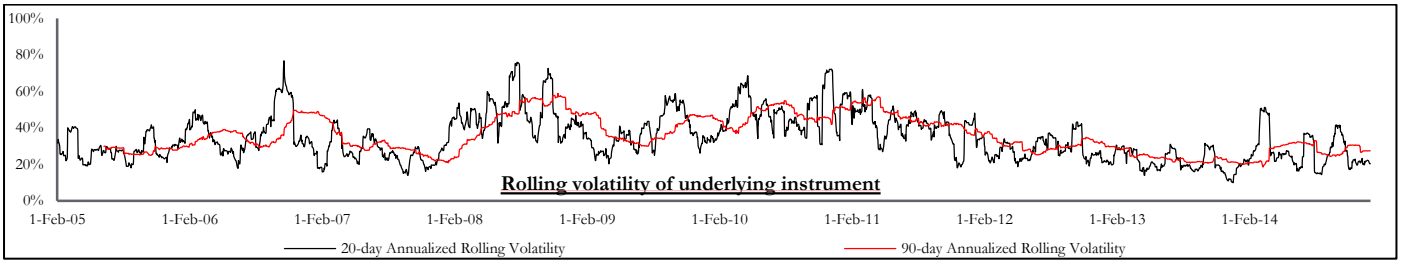




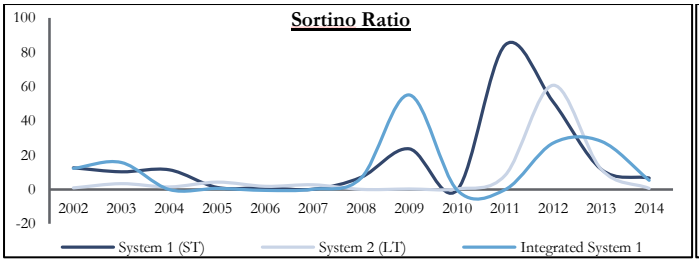
Sugar

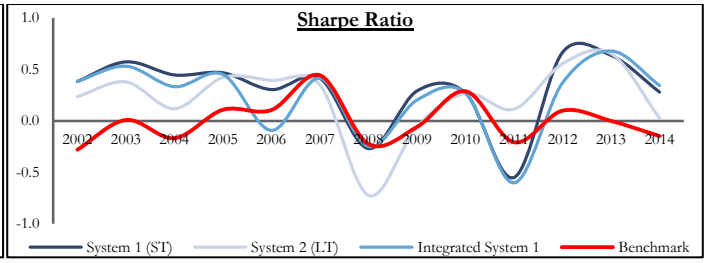




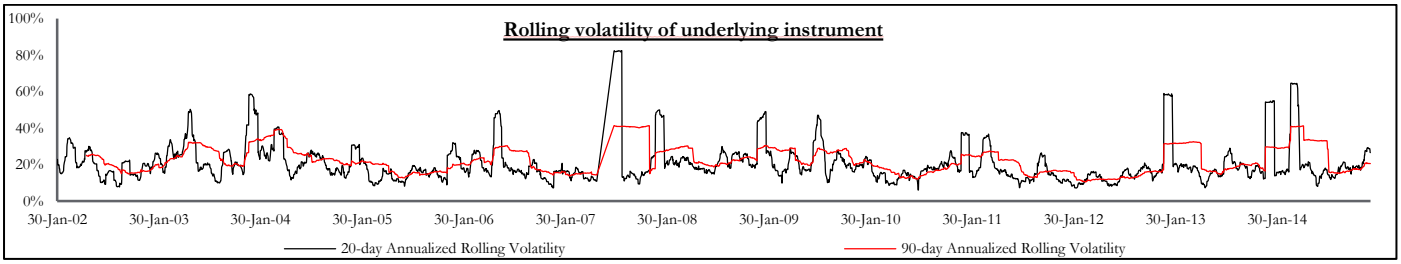


Sunflower seeds



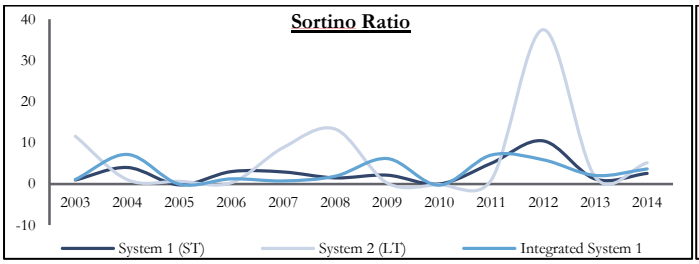


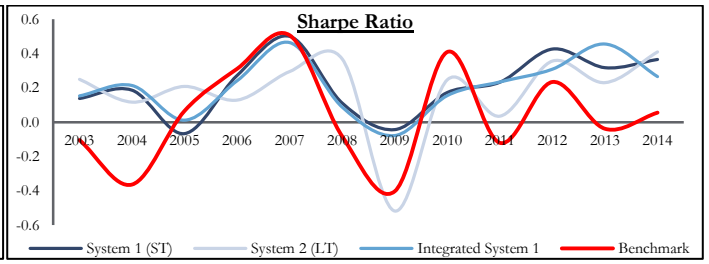
*2004 & 2011 – Integrated system 1 saw no downside risk as a result of a negative benchmark returns yielding an immaterial calculation

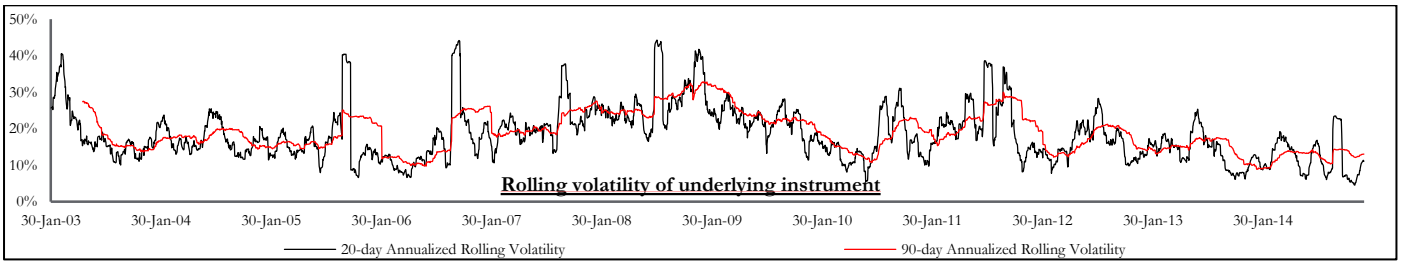


* significant increase in data as a result of rebasing of futures data from the data source. Smoothing not conducted to ensure consistency

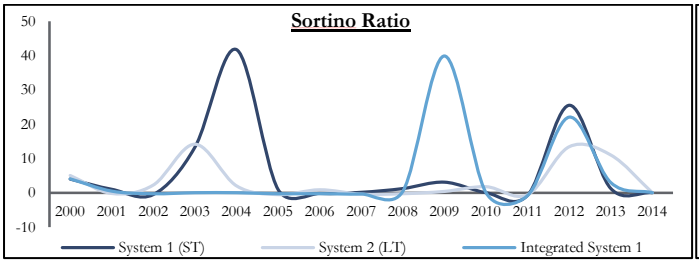
Wheat

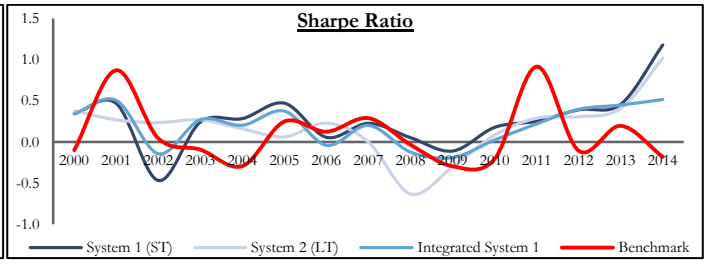




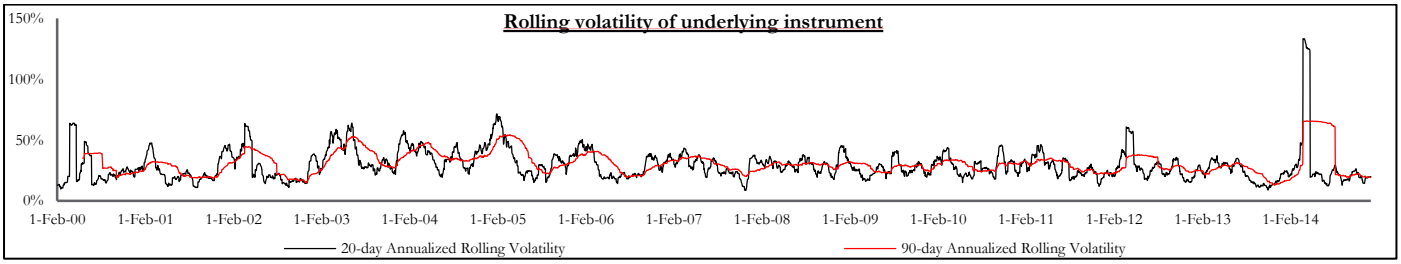


White Maize

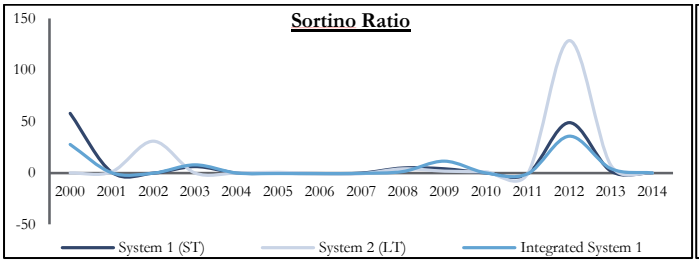


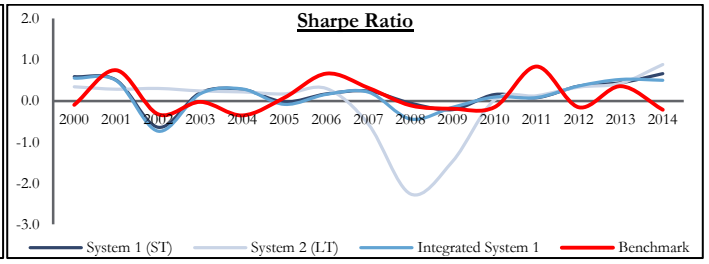


*2010 (s1) and 2003,2004 & 2010 (integrated system 1) and 2014 (all systems) saw no downside risk as a result of a negative benchmark returns yielding an immaterial

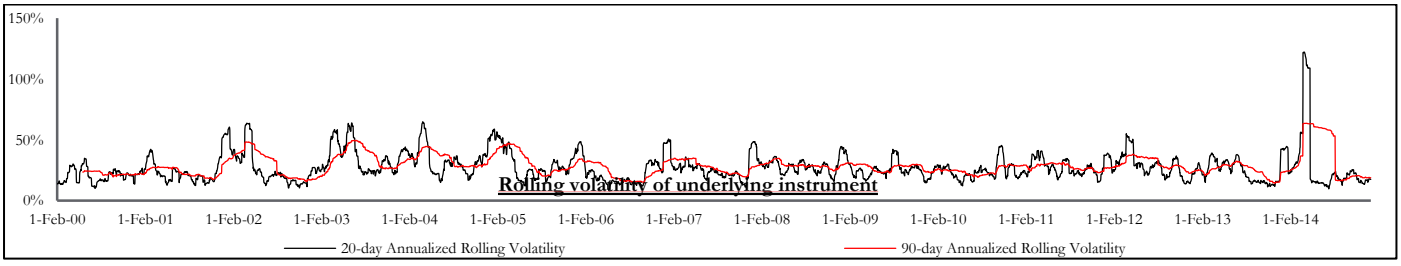


Yellow Maize



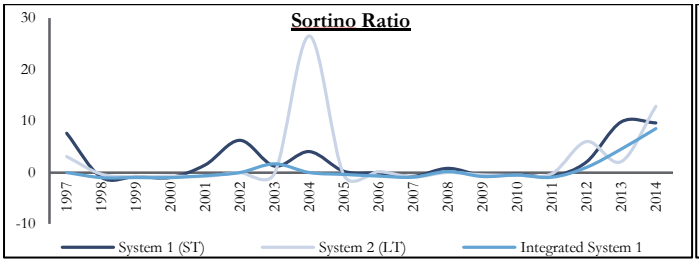


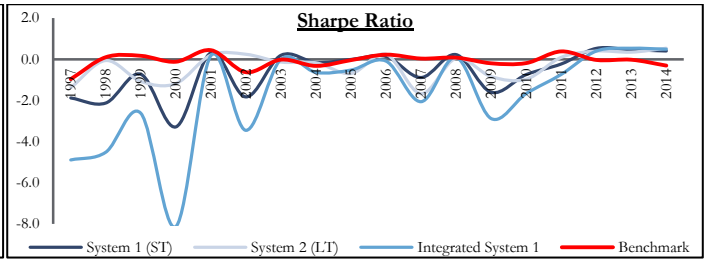
* 2004, 2010(s1); 2000, 2003, 2004(s2) & 2004, 2010 (integrated system 1) and 2014 (all systems) saw no downside risk as a result of a negative benchmark returns



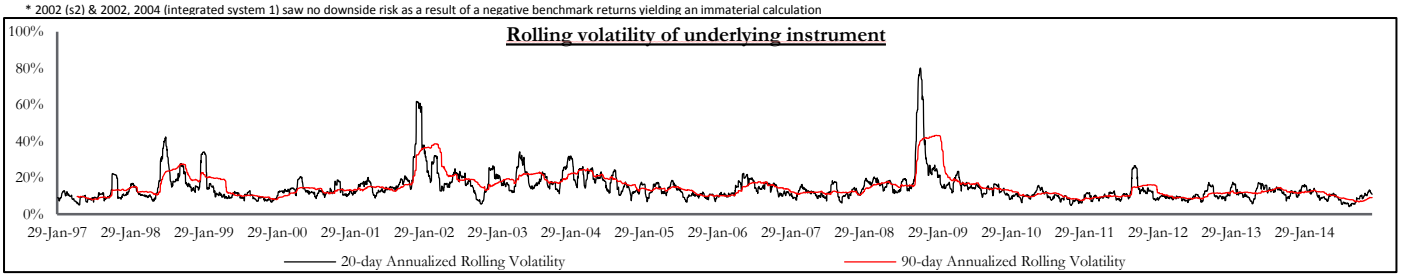
Currencies

AUD/ZAR

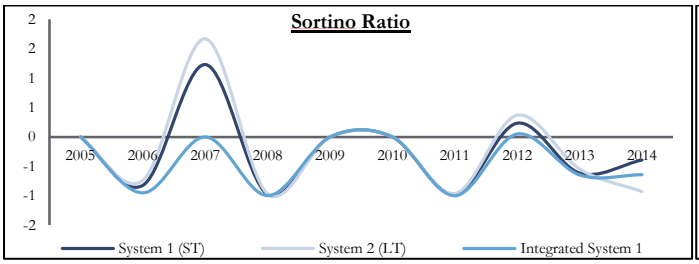


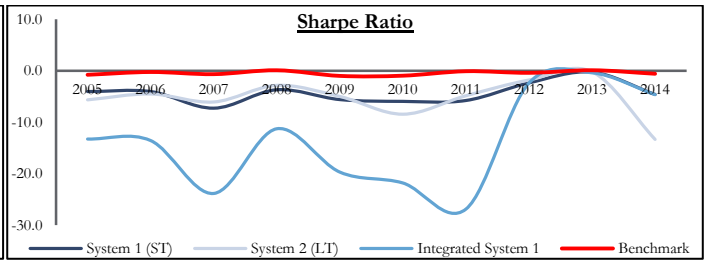


* 2002 (s2) & 2002, 2004 (integrated system 1) saw no downside risk as a result of a negative benchmark returns yielding an immaterial calculation

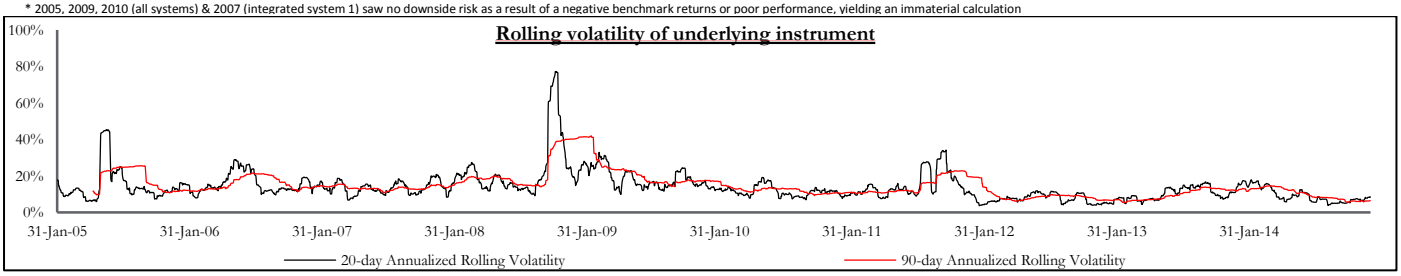


BWP/ZAR

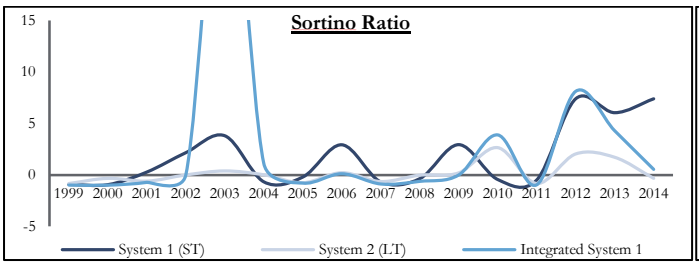


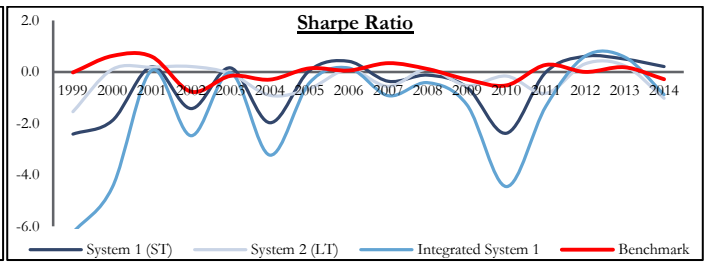


* 2005, 2009, 2010 (all systems) & 2007 (integrated system 1) saw no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

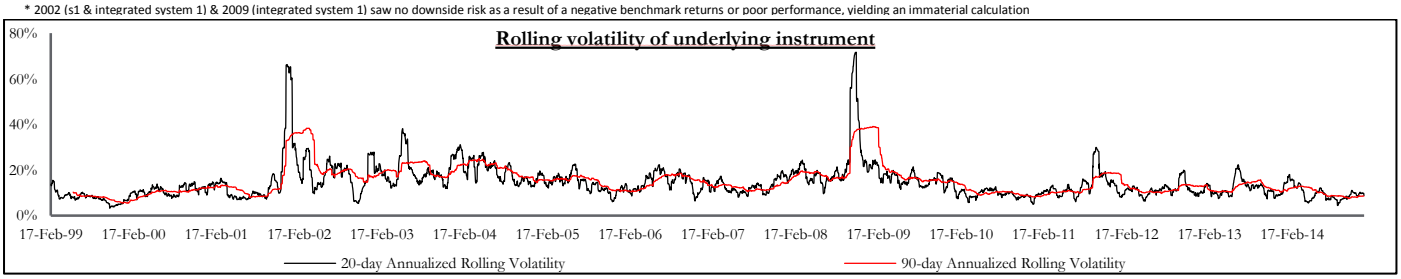


CAD/ZAR

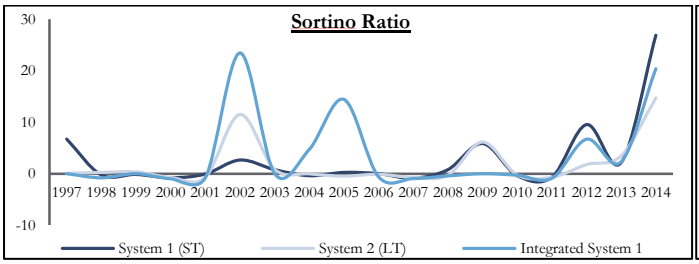


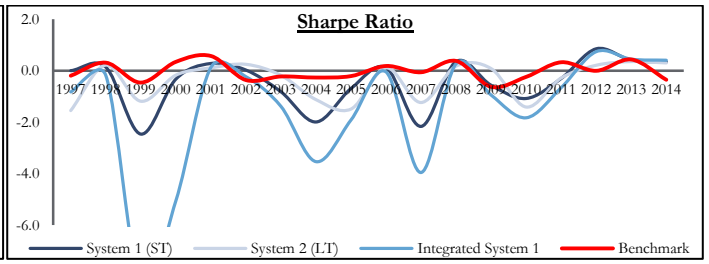


* 2002 (s1 & integrated system 1) & 2009 (integrated system 1) saw no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

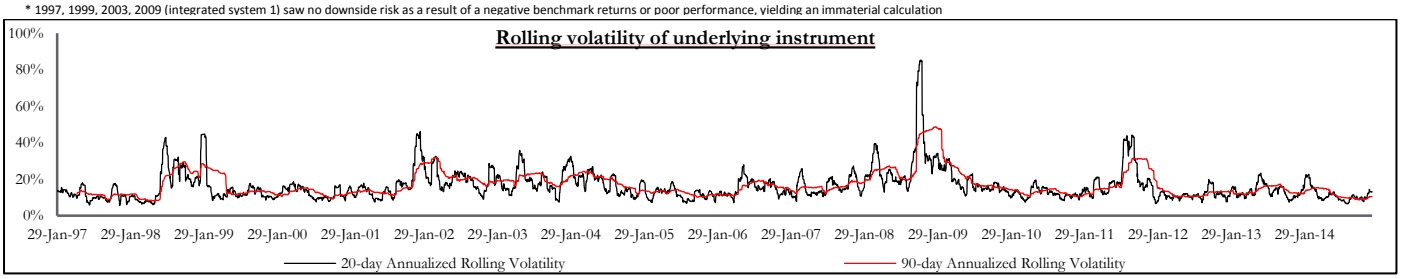


CHF/ZAR

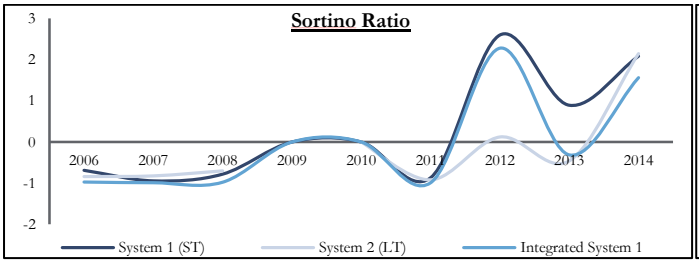


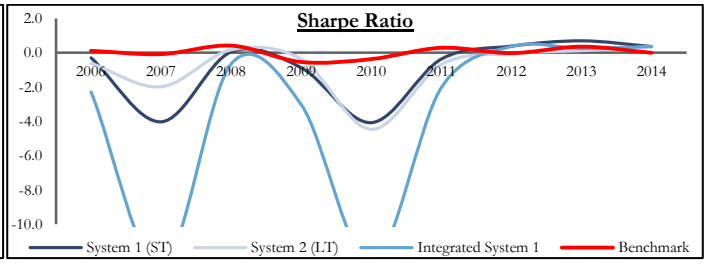


* 1997, 1999, 2003, 2009 (integrated system 1) saw no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

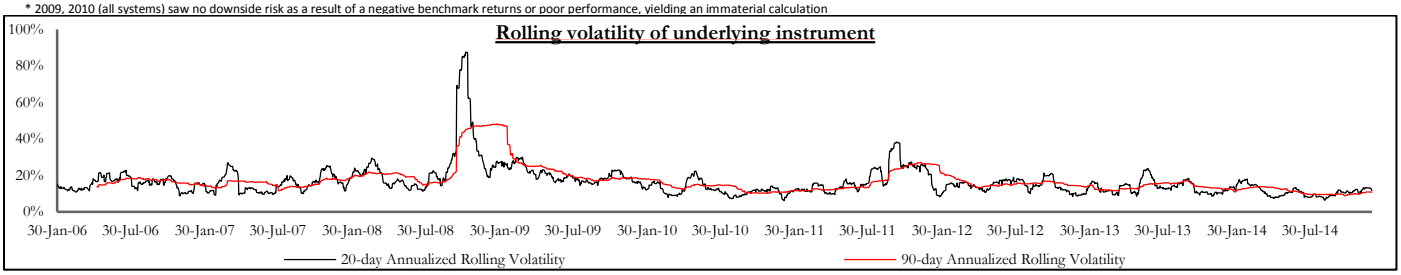


CNY/ZAR

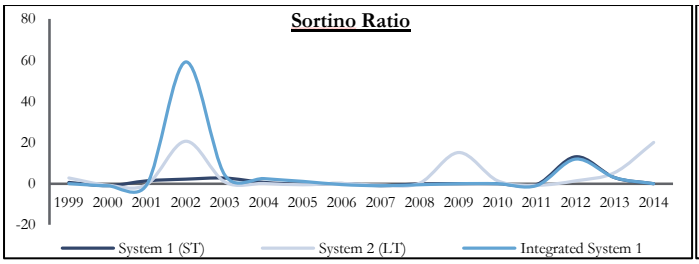


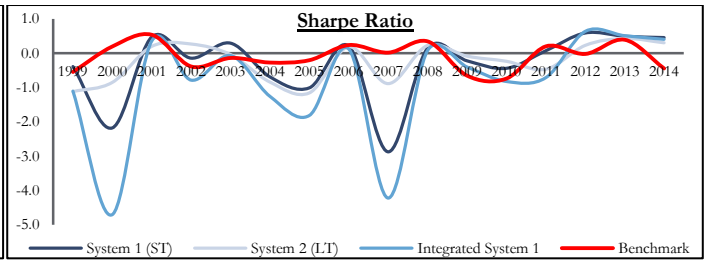


* 2009, 2010 (all systems) saw no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

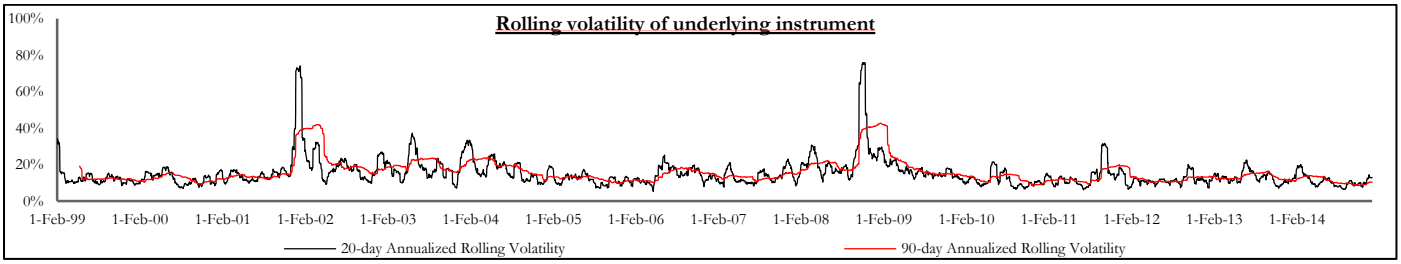


EUR/ZAR

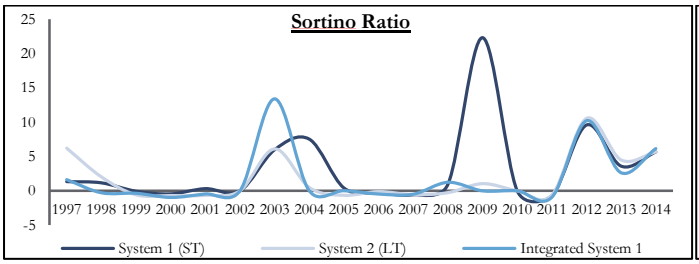


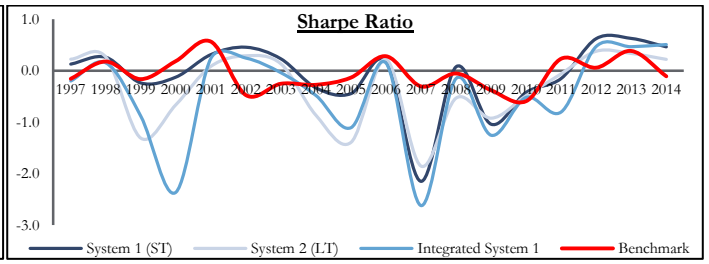


* 2009, 2010 (s1 and integrated system 1) & 1999 (integrated system 1) and 2014 (s1 & s3) saw no downside risk as a result of a negative benchmark returns or poor performance, yielding an

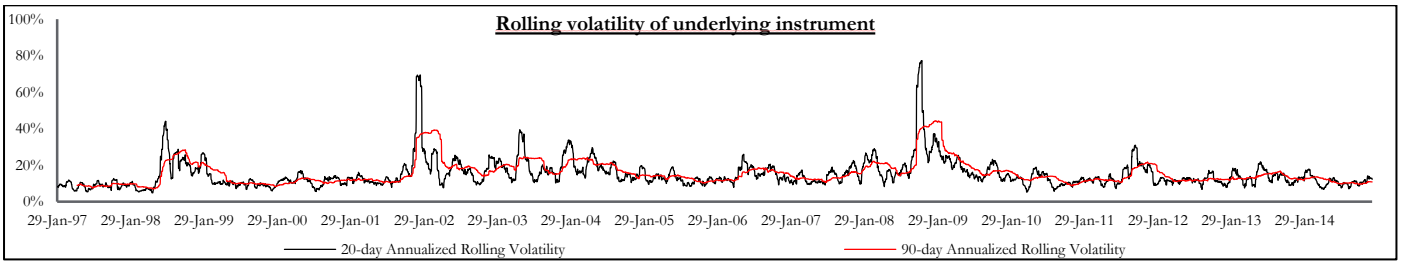


GBP/ZAR

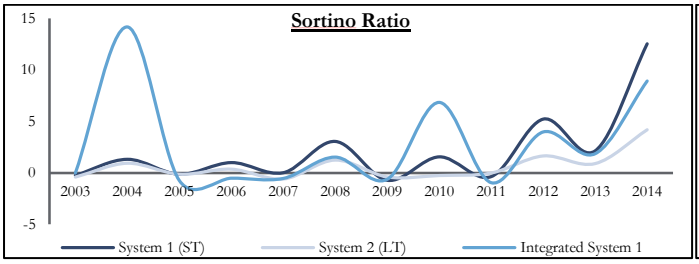


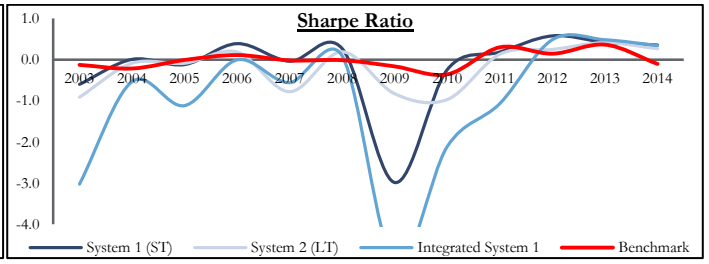


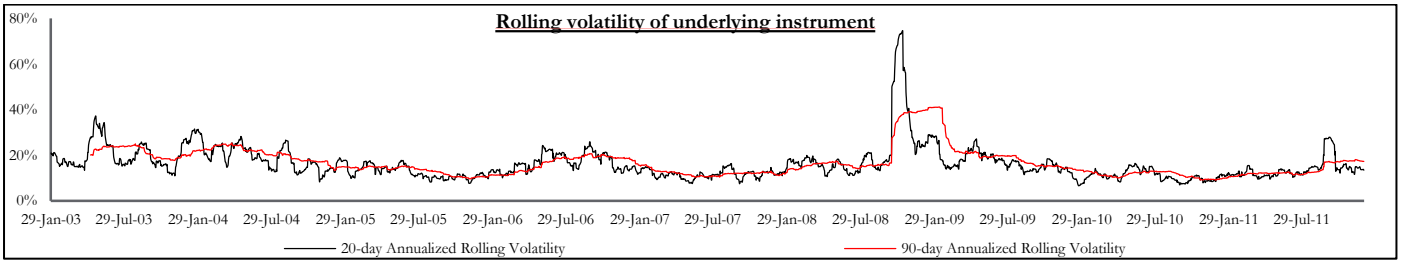
* 2002, 2010 (all systems) & 1999 (integrated system 1) saw little or no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation



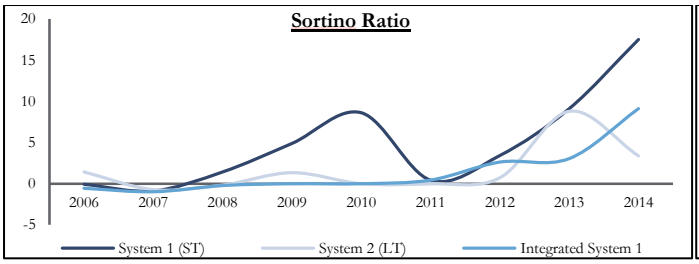
NZD/ZAR

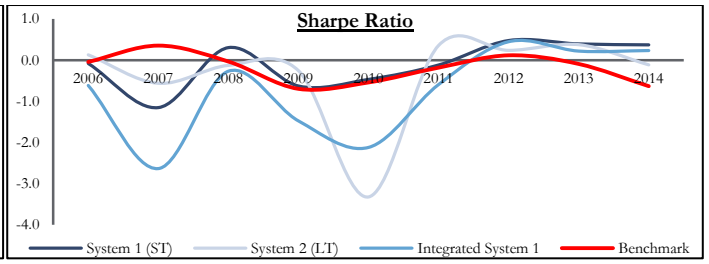




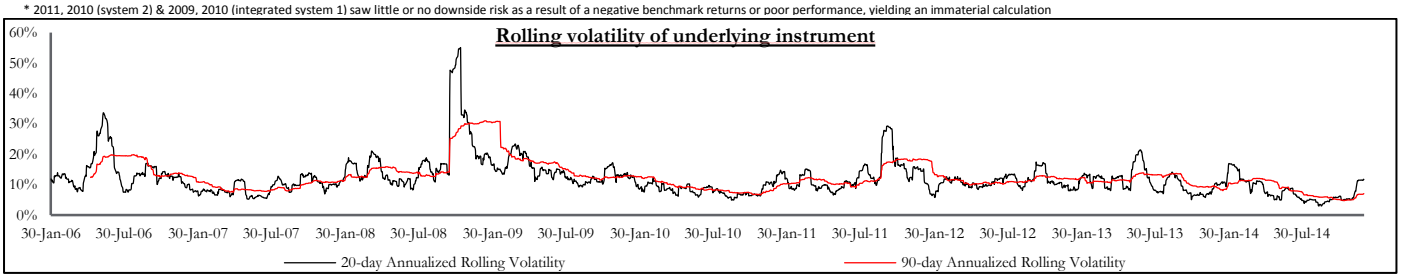


TKL/ZAR

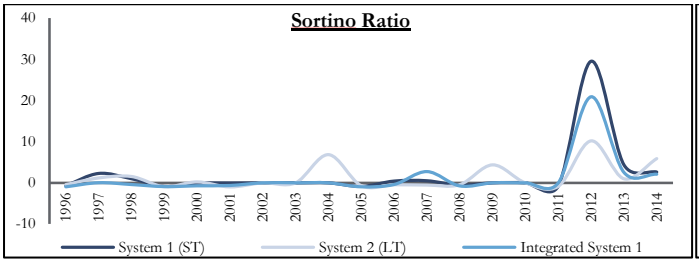


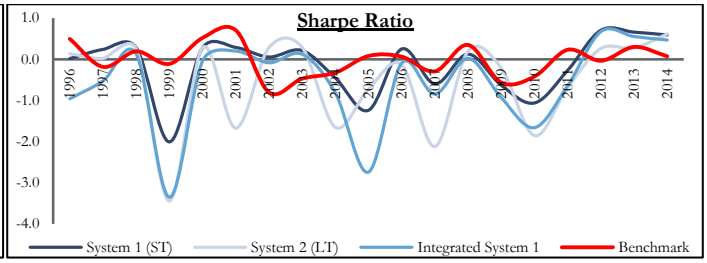


* 2011, 2010 (system 2) & 2009, 2010 (integrated system 1) saw little or no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

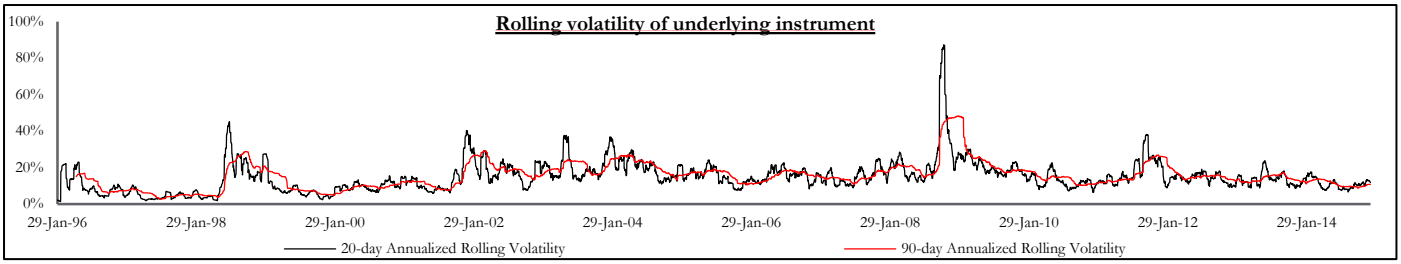


USD/ZAR

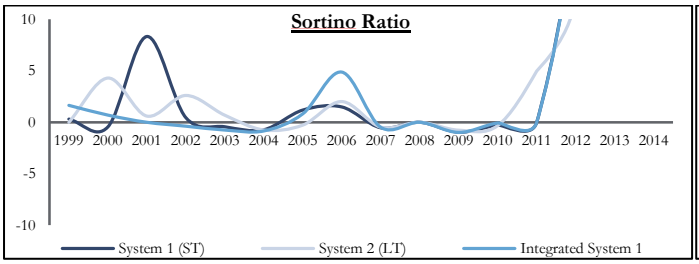


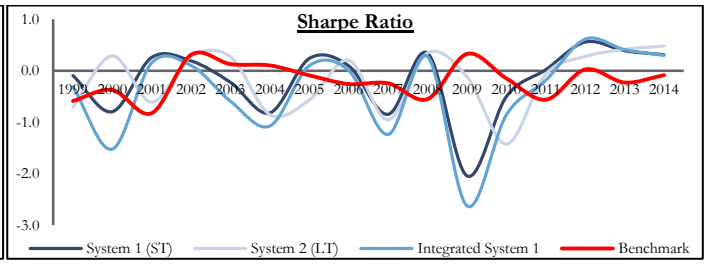


* 2002, 2003,2010 (all systems) & 2009, 2004 (s1 & integrated system 1) saw little or no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial

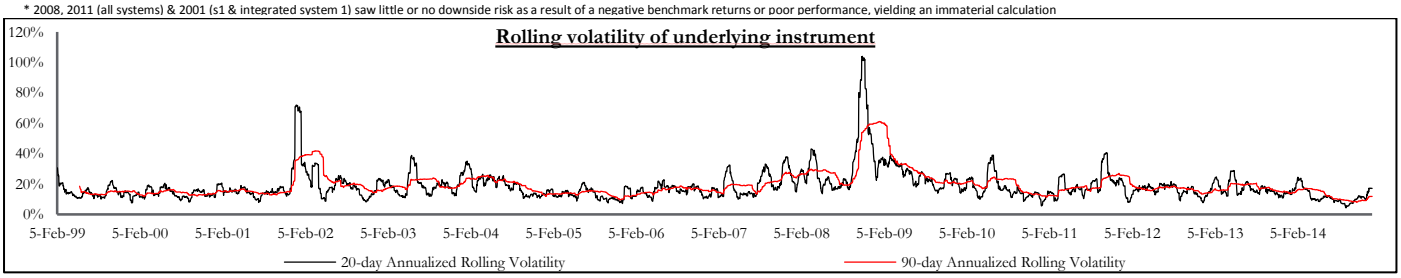


ZAR/JPY



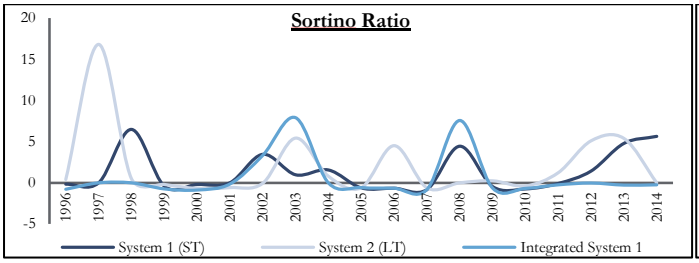


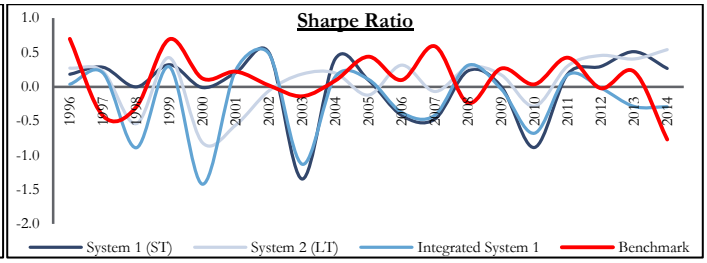
* 2008, 2011 (all systems) & 2001 (s1 & integrated system 1) saw little or no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation



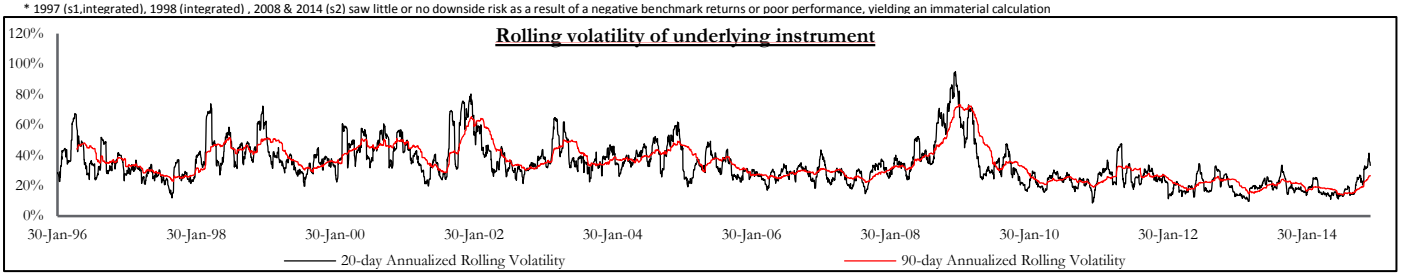
Energy

Brent Crude

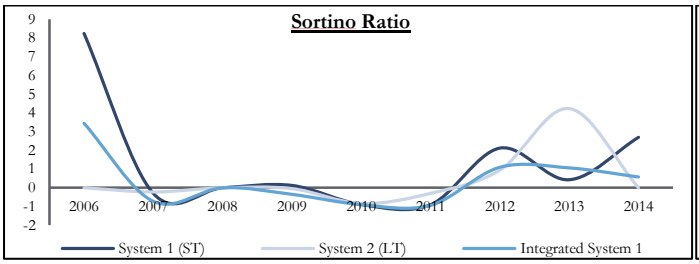


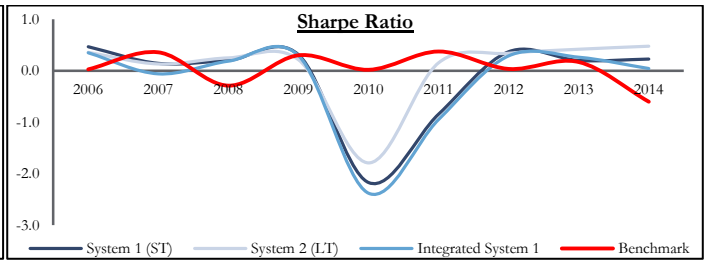


* 1997 (s1,integrated), 1998 (integrated) , 2008 & 2014 (s2) saw little or no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

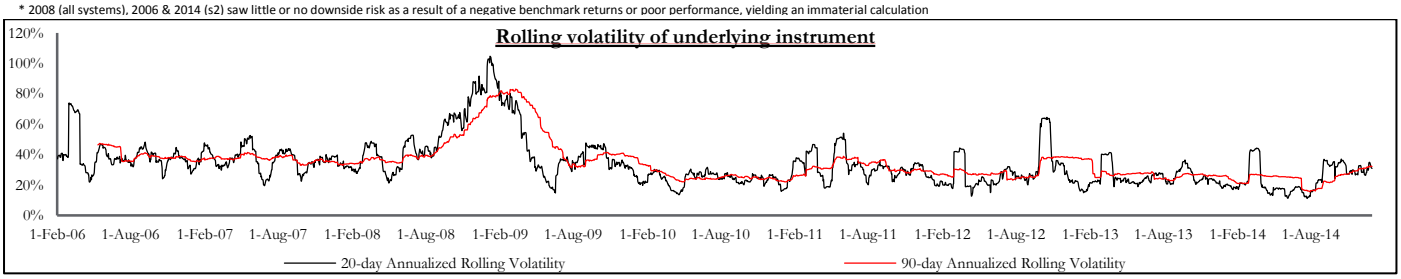


Gasoline

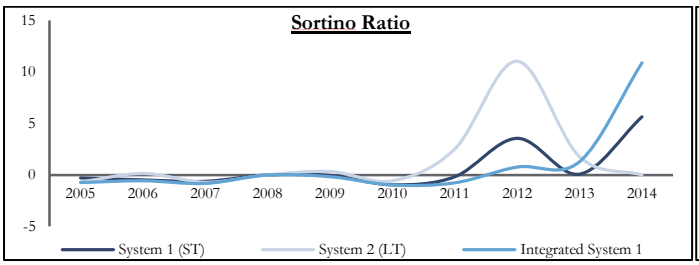


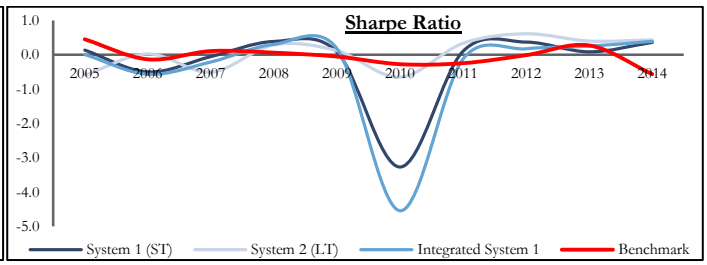


* 2008 (all systems), 2006 & 2014 (s2) saw little or no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

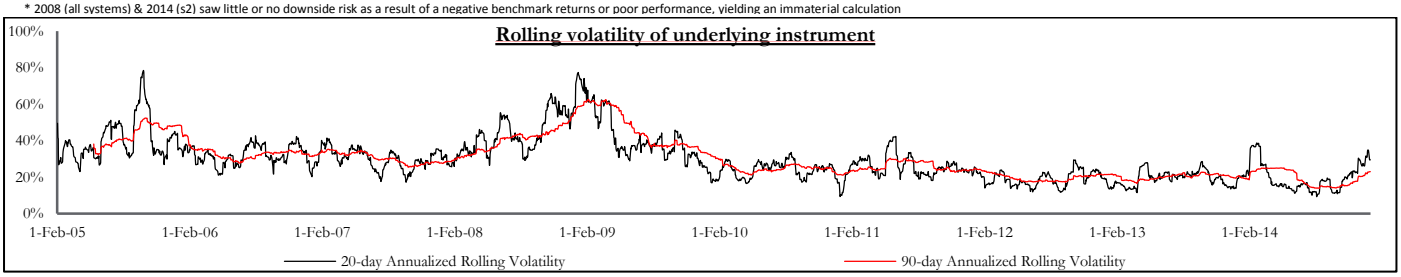


Heating Oil

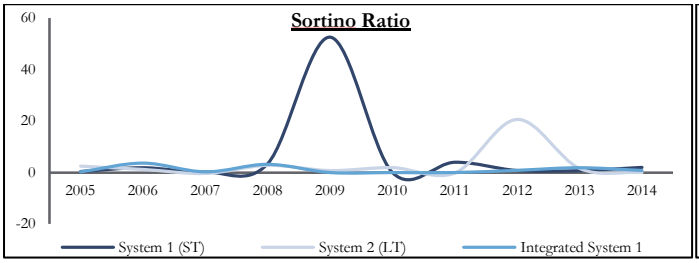


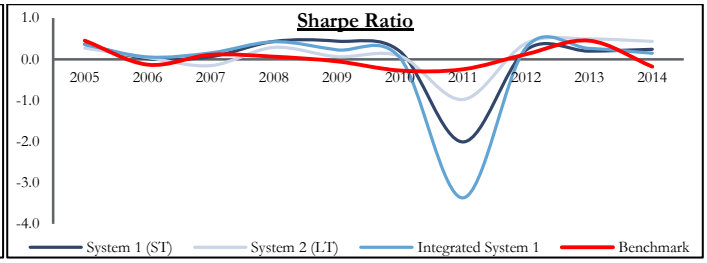


* 2008 (all systems) & 2014 (s2) saw little or no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation

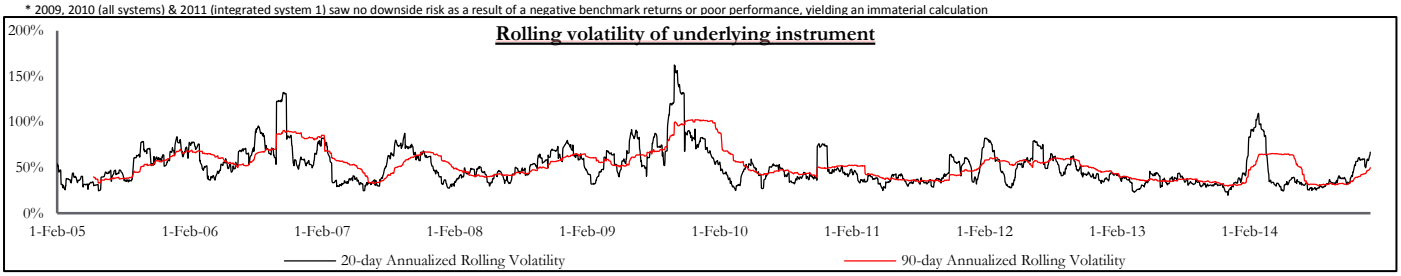


Natural Gas

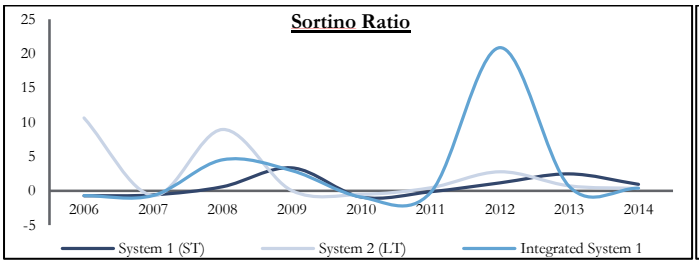


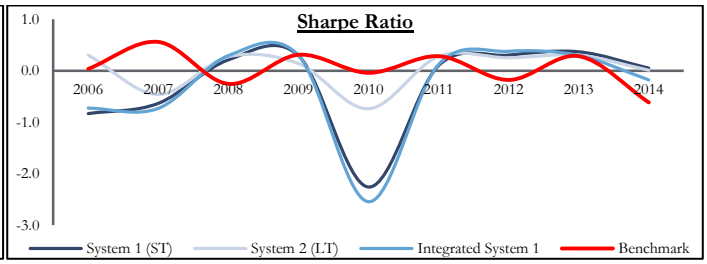


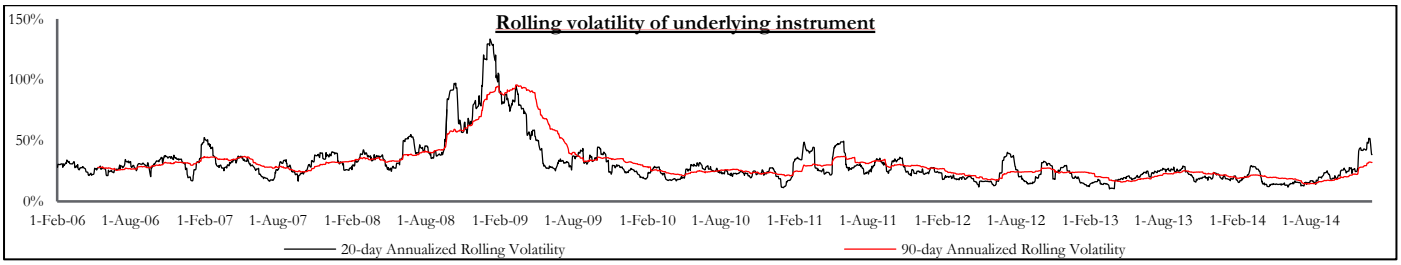
* 2009, 2010 (all systems) & 2011 (integrated system 1) saw no downside risk as a result of a negative benchmark returns or poor performance, yielding an immaterial calculation



WTIA Crude Oil

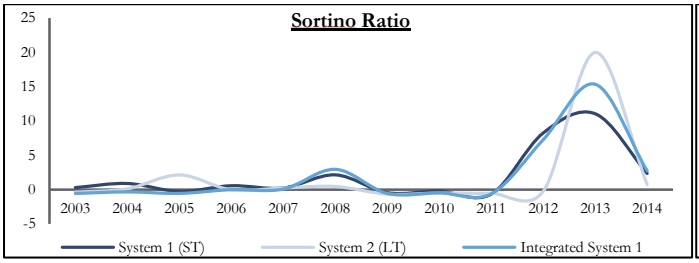


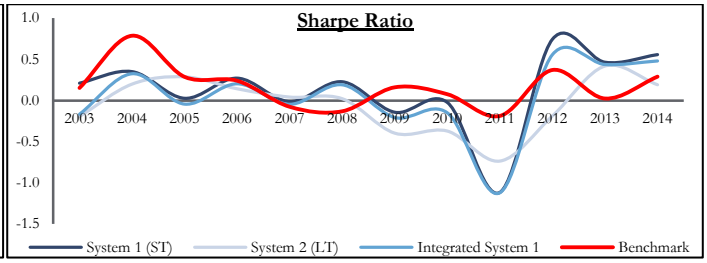




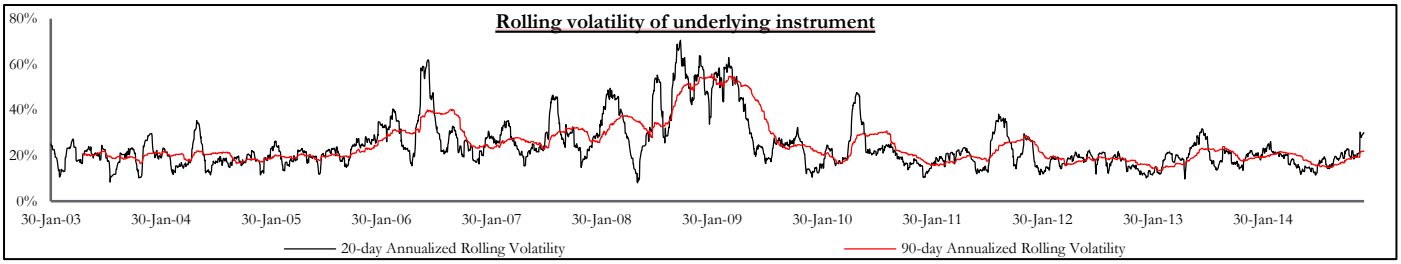
Equity Indices

African Banks

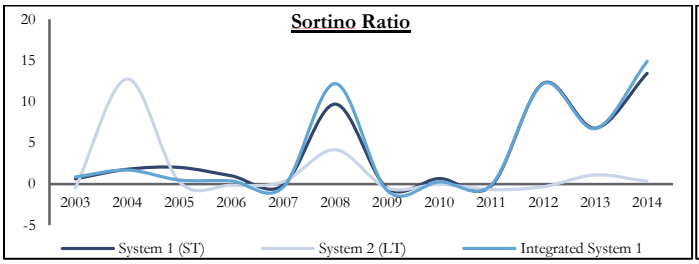


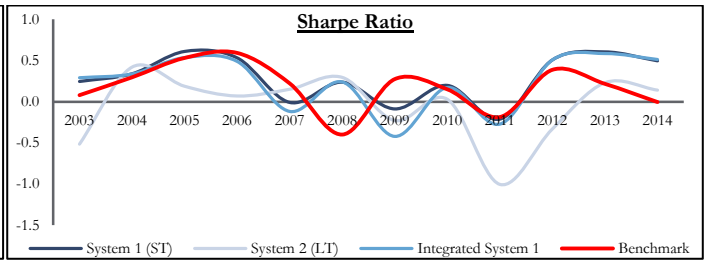


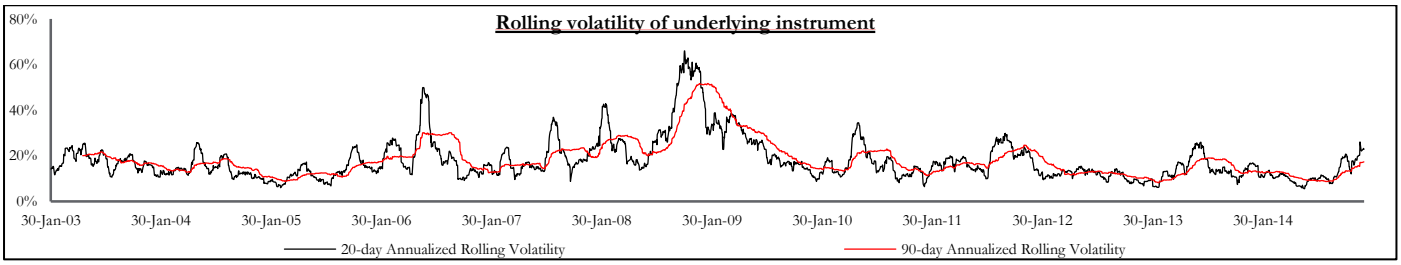
* 2013 (S2) generated an outlying value and was subsequently smoothed to 20



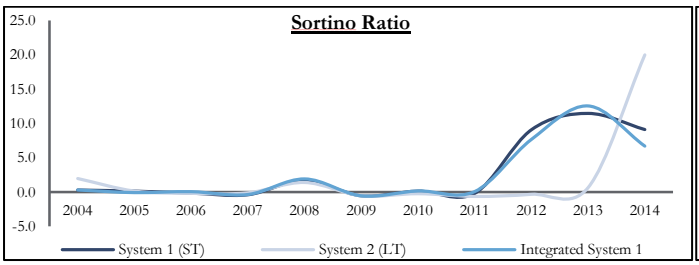
ALSI

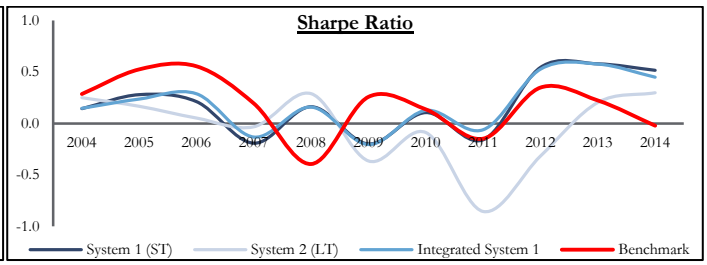




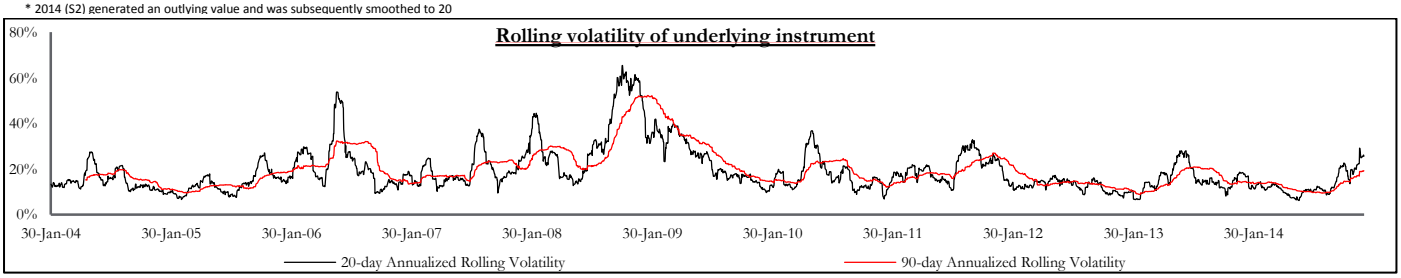


Capped Top40

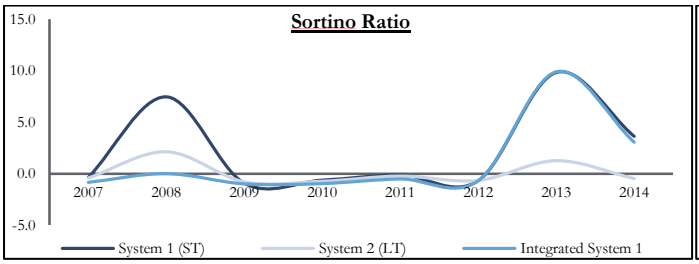


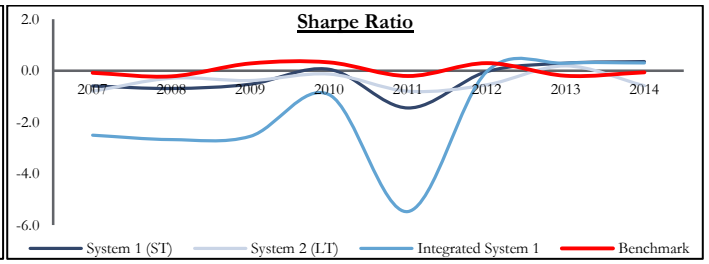


* 2014 (S2) generated an outlying value and was subsequently smoothed to 20

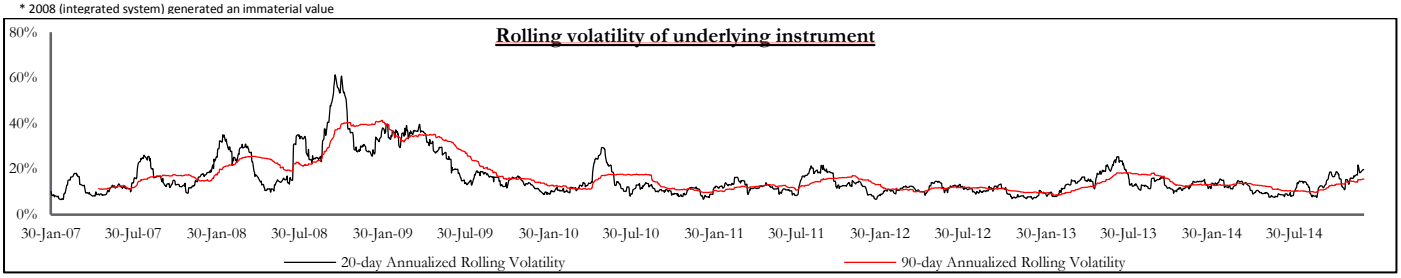


DiviPlus

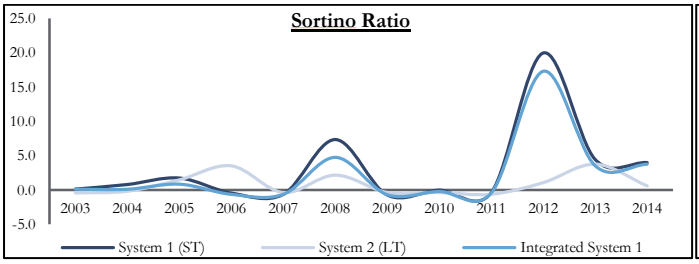


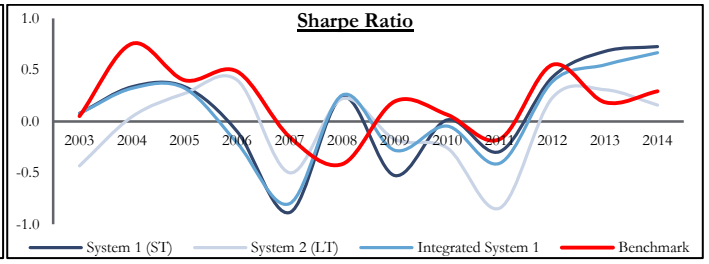


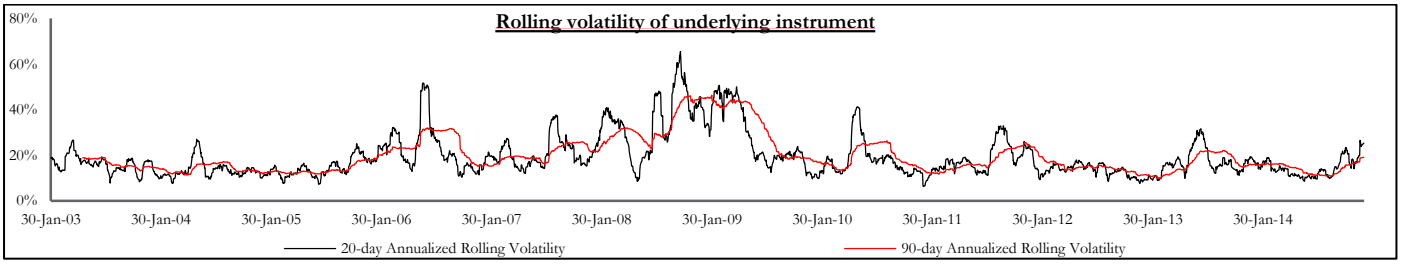
* 2008 (integrated system) generated an immaterial value



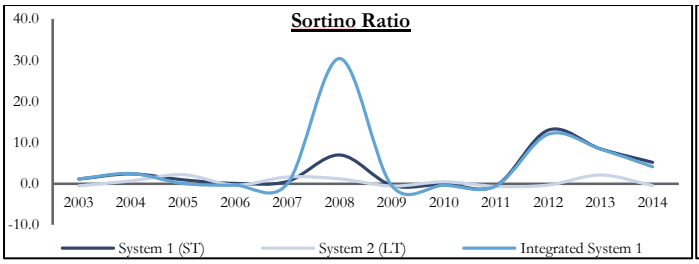
FIN15

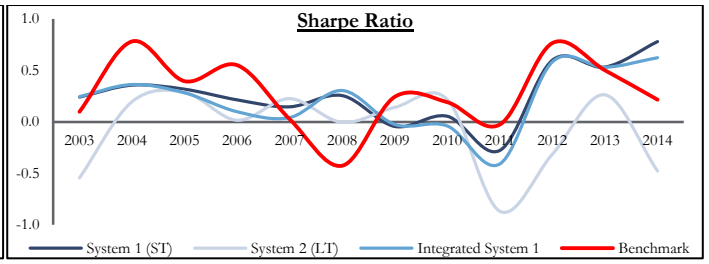


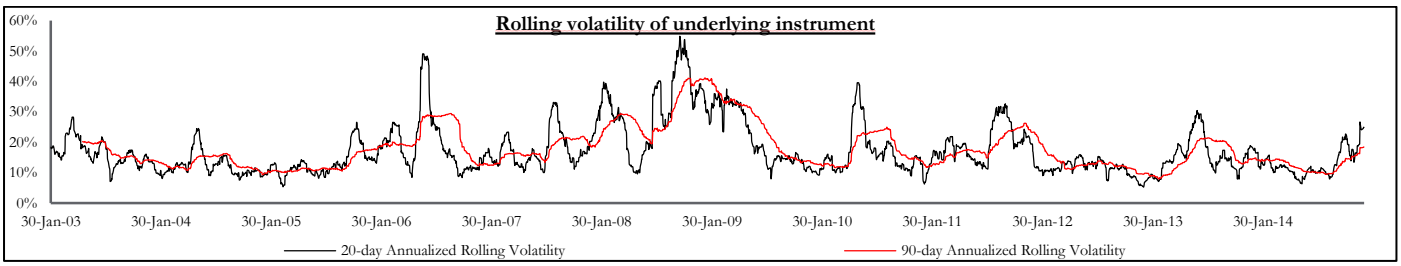




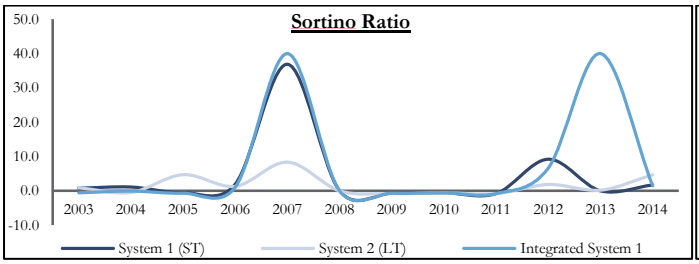
FINDI30

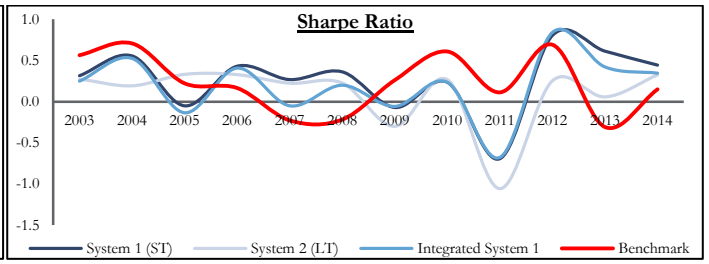




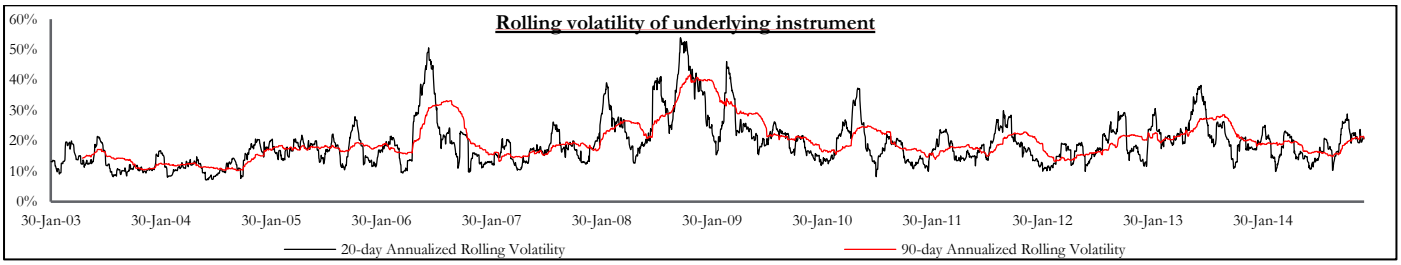


General Retailers

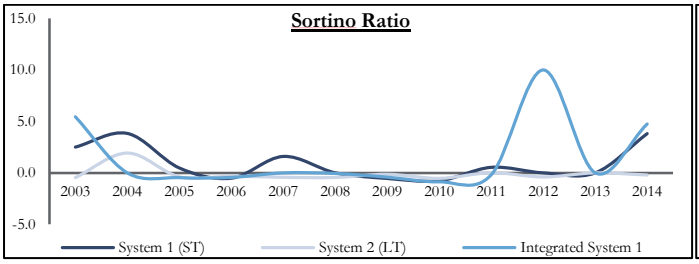


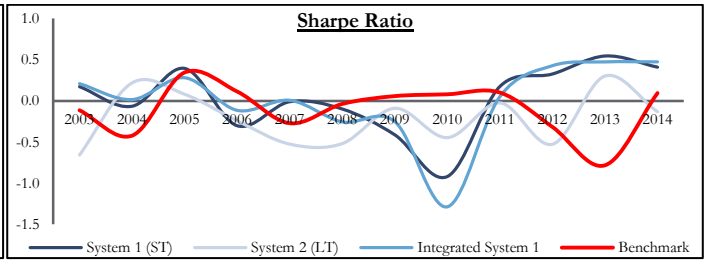


* 2007 & 2013 (S3) generated outlying values and were subsequently smoothed to 40. 2008 (all systems) produced immaterial values

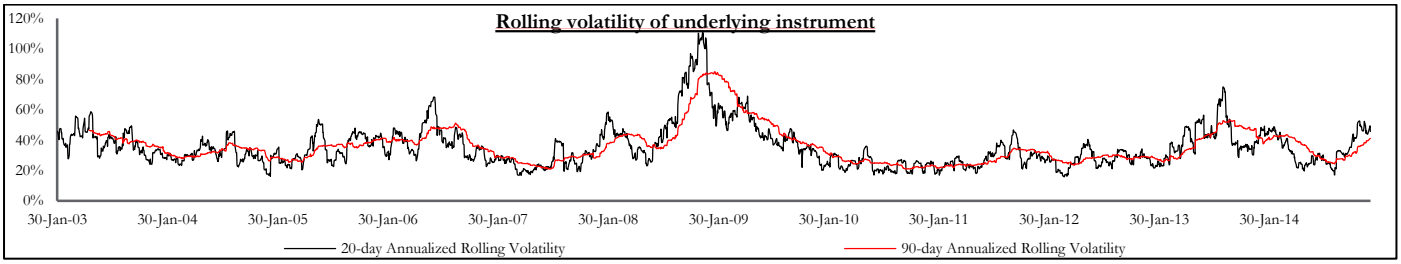


GLDX

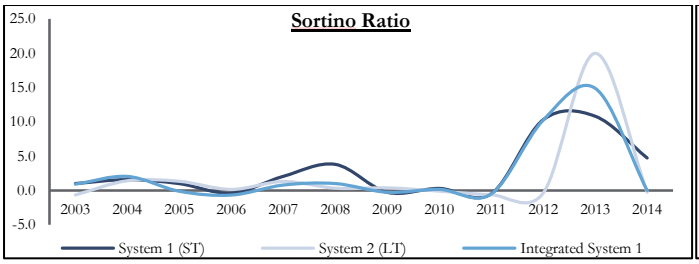


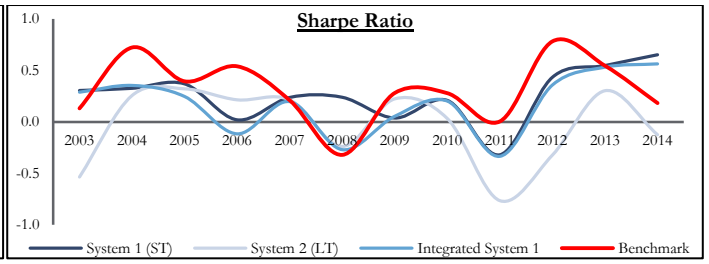


* 2004, 2007 (S3) & 2013 (s1) produced immaterial values

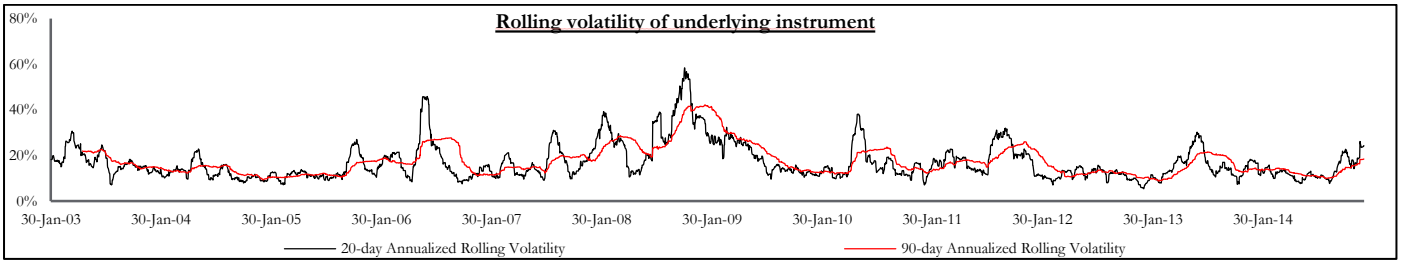


INDI25

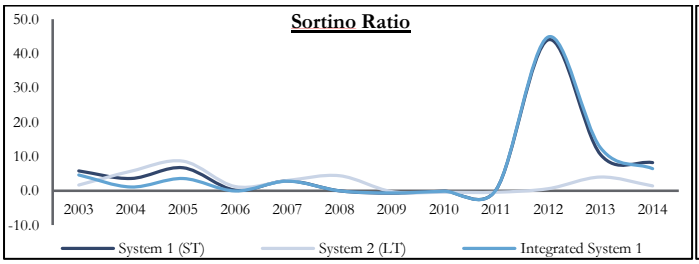


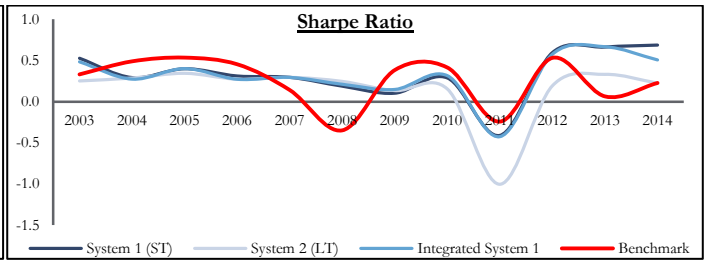


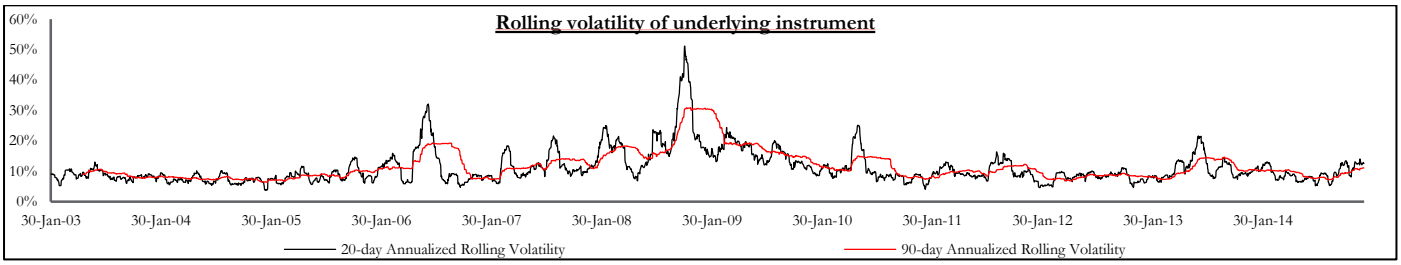
* 2013 (S2) generated outlying values and were subsequently smoothed to 20. 2014 (s3) produced immaterial values



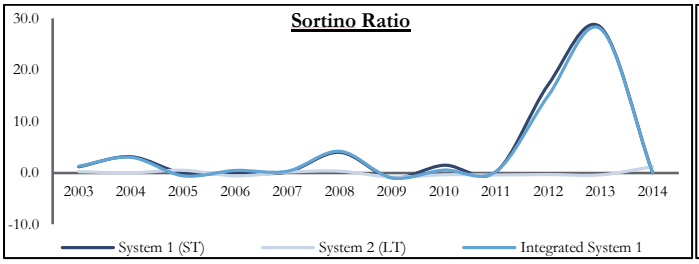
MidCap60

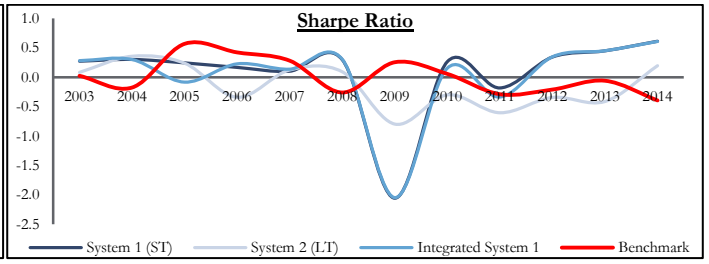




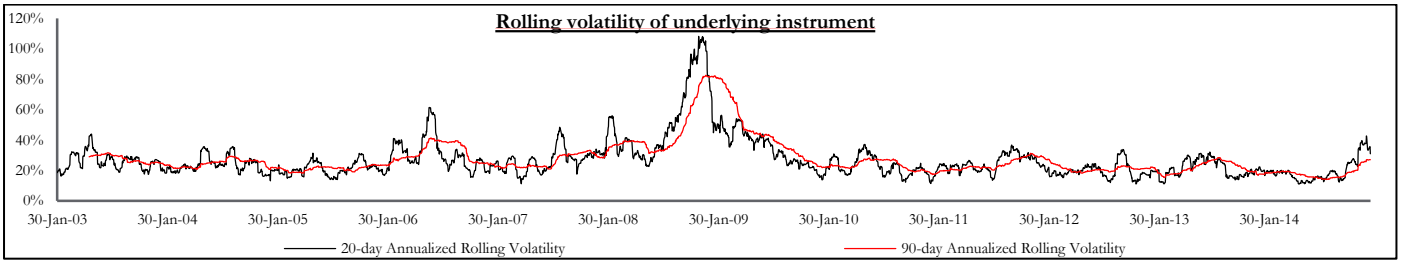


RESI10

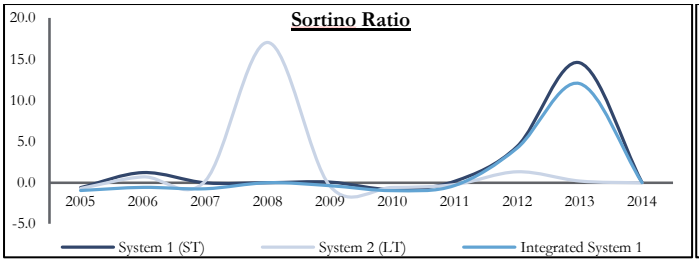


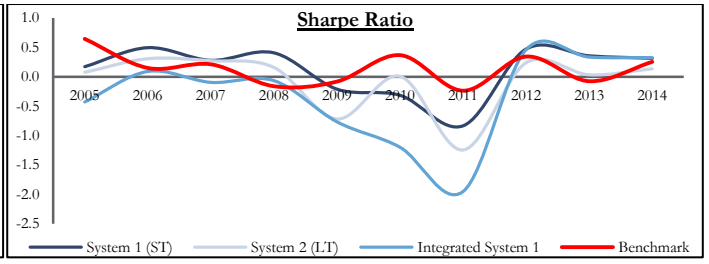


* 2004 (s2) & 2014 (s1 & s3) produced immaterial values

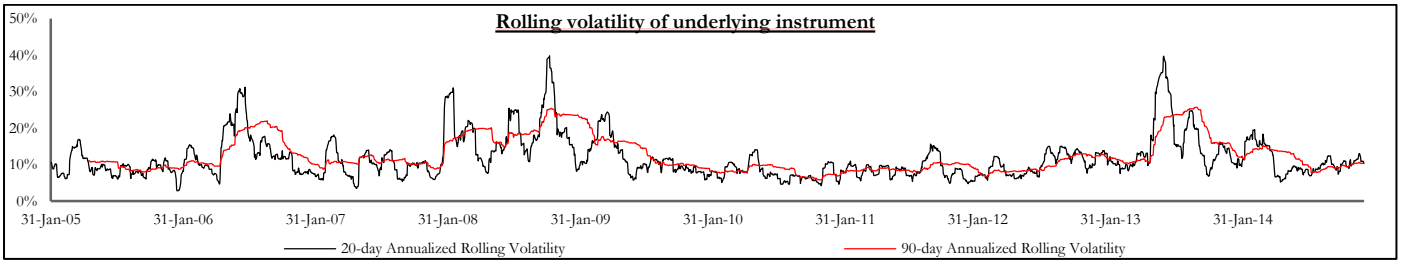


SA Property

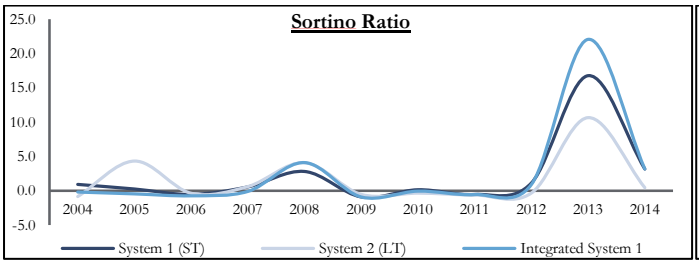


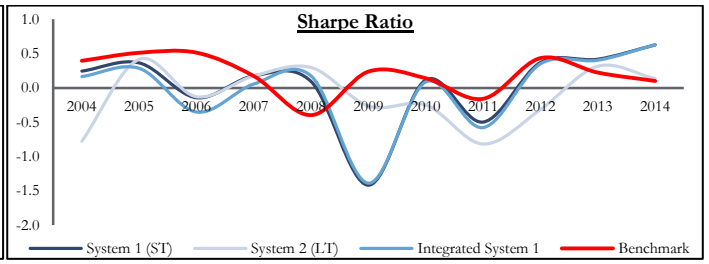


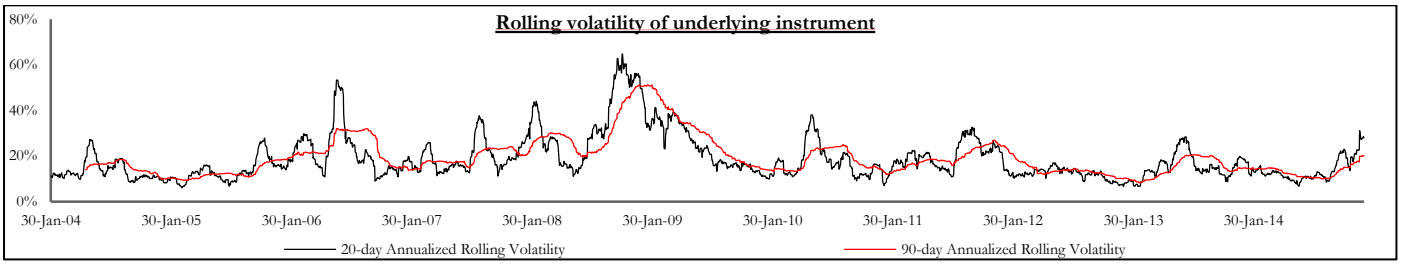
* 2008 (s1 &s3) produced immaterial values



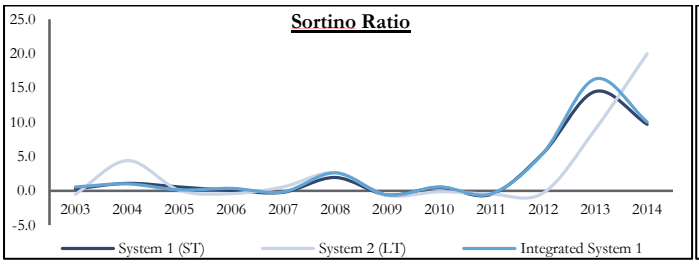
SWIX Top40

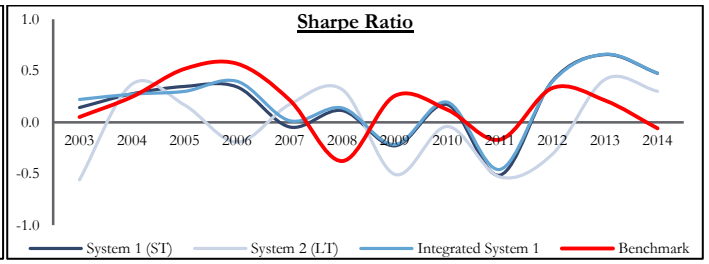




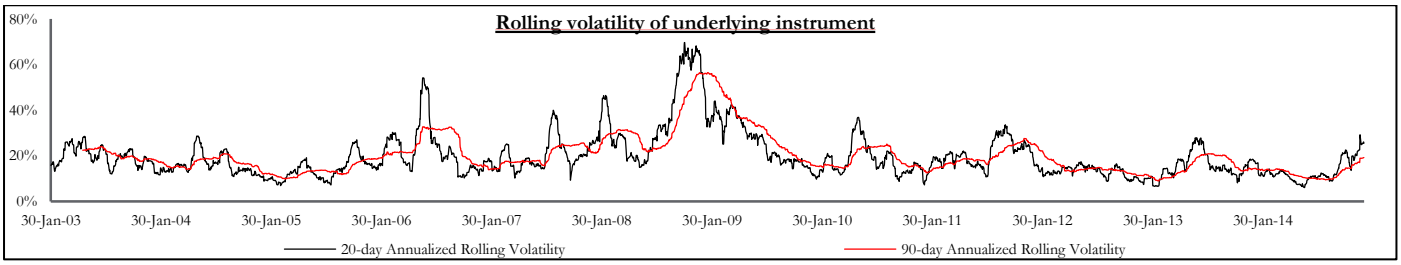


TOP40



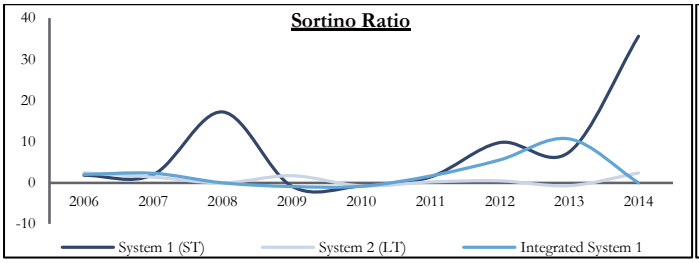


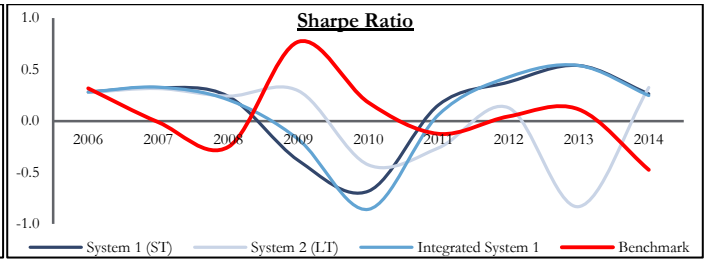
* 2014 (s2) generated an outlying value and was smoothed to 20



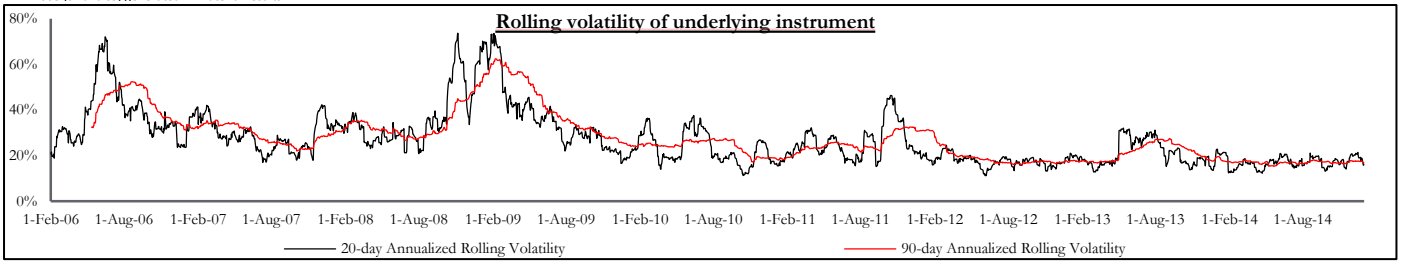
Precious Metals

Copper

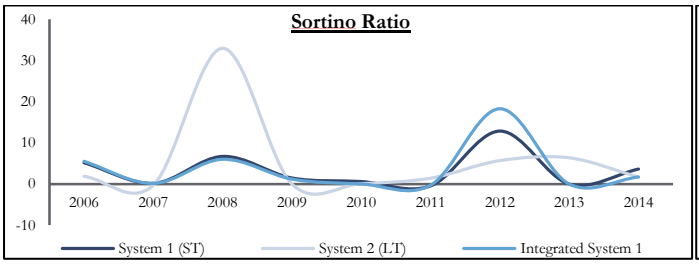


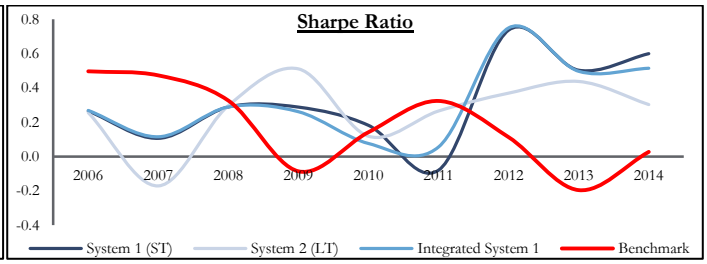


* 2008 (s2 and s3) generated immaterial results

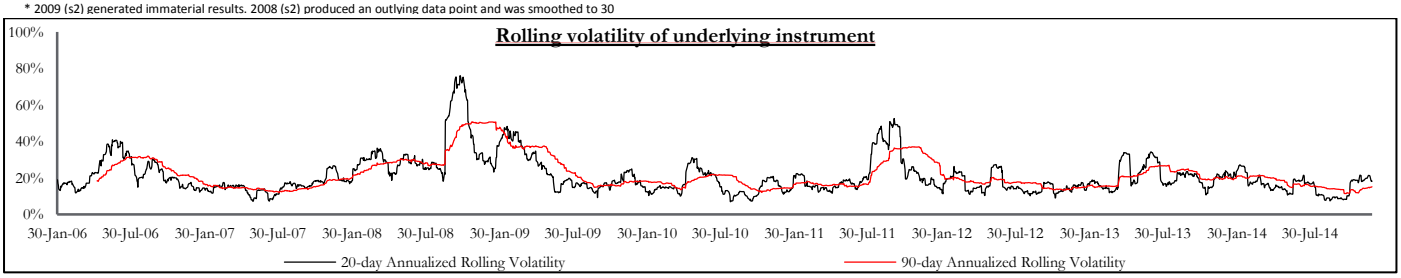


Gold

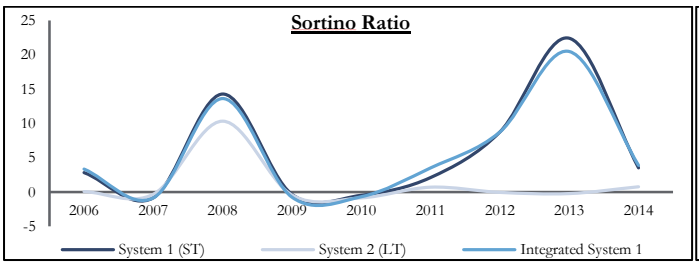


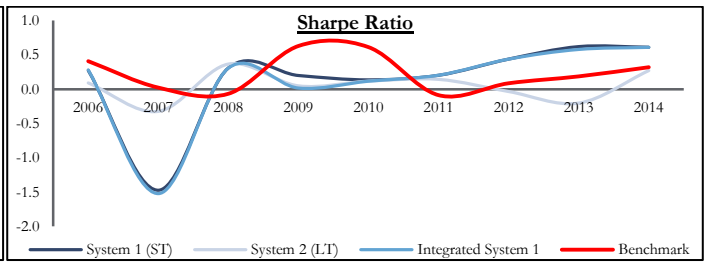


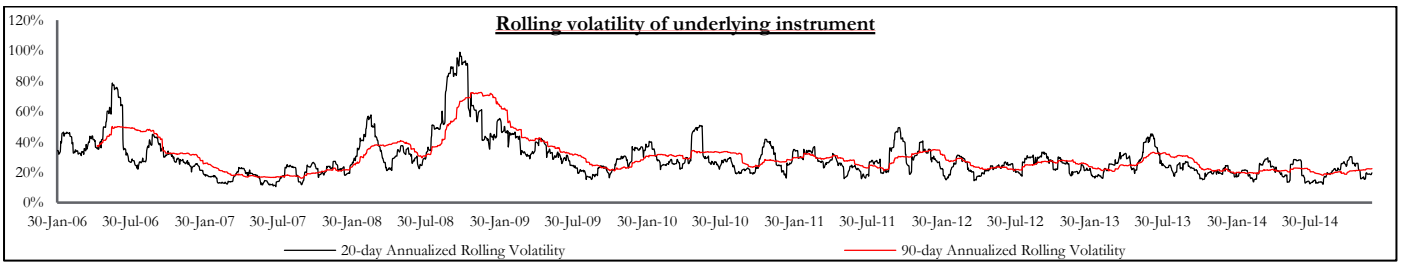
* 2009 (s2) generated immaterial results. 2008 (s2) produced an outlying data point and was smoothed to 30



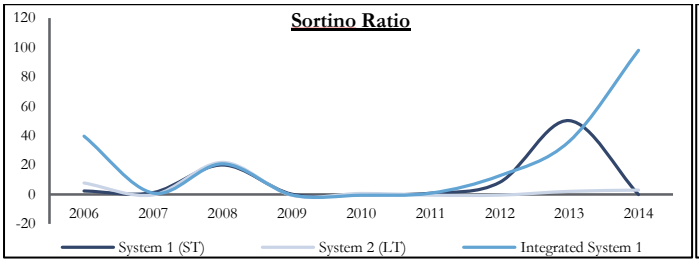
Palladium

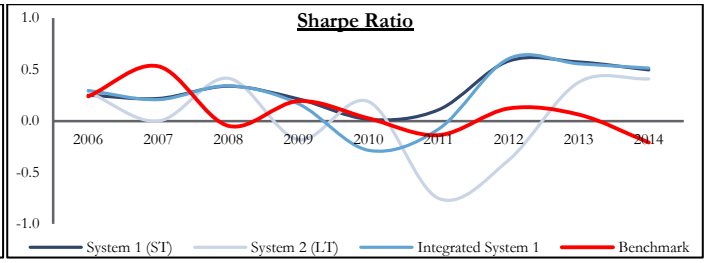


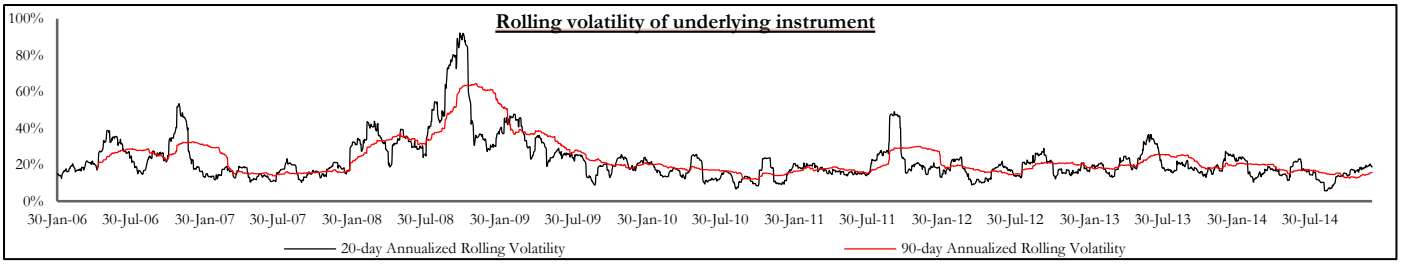




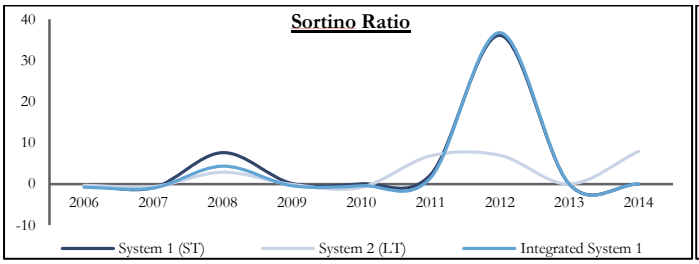
Platinum

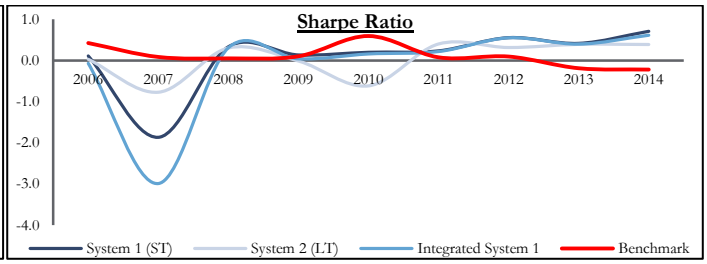






Silver





* 2013 (all systems) and 2014 (s1 & integrated system) generated immaterial results